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AND THOUGHT

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THE GENESIS OF LIFE AND THOUGHT

BY
THOMAS H. MUSICK
AUTHOR OF "GENESIS OF NATURE".

"*A fact is always a fact, whatever may be the consequences.*"—M. PAUL JANET.

NEW YORK
JOHN B. ALDEN, PUBLISHER
1893

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THOMAS H. MUSICK.

PREFACE.

Although an independent argument the present work is, in the main, but an extension of the line of thought presented in "*Genesis of Nature*," given to the public by the author a year ago. The first chapter outlines the general aim of the discussion. In the second will be found an analytic consideration of some of the fundamental principles of metaphysical philosophy. That no logical gaps may be left down in the rear, the third chapter is devoted to the classification and analysis of various systems of Ontology. The fourth chapter discusses Thought and Mind so far as is deemed necessary to keep the line of argument rounded out. The next two chapters set forth with considerable completeness the author's somewhat original views concerning Heredity and Life. The seventh chapter considers the philosophy of Evolution, particularly in its several phases as presented by the schools of M. LAMARCK, Mr. DARWIN and Prof. COPE. The last three chapters, as the headings indicate, discuss the subjects of Miracle, Man and Immortality, considering them in the light of the principles set forth in the earlier pages.

It will be found that all the way through, the discussion is carried on under the full effulgence (whether real or factitious) of the Doctrine of Evolution; nevertheless, all that great mass of thought and learning which deals directly with the

general question of the truth or untruth of Evolution, the author leaves untouched, partly because of inadequacy of space and time for its satisfactory consideration, partly because his studies in that direction have not been so full as to give him entire confidence in his own conclusions, and partly because he deems it a matter of inferior importance to the issues actually discussed. What he has attempted to do is to show that whether the doctrine of Evolution be true or false, Science has not yet propounded any theory which accounts for it ; and more than this, that no sufficient theory can be propounded so long as the attempt is made to exclude intelligent purposiveness from organic Nature. In other words, the line of the argument is to show that whether the world of Life be an Evolution or not it is, at least, in one way or the other, an intelligent purposive Creation ; that God *creates* and governs all, whether wholly or partially by evolutionary processes or wholly by other methods.

In the discussion the author has endeavored to bring to bear a soberness of thought suited to the grandeur of the subject, always keeping in mind the salutary admonition of the great logician, JOHN STUART MILL : "The only sound intellects are those who, in the first instance, set their standard of proof high."

For the many insufficiencies of matter and imperfections of style which will, as the author expects, be detected by the careful reader, the only apology he can offer is, that the whole work has been written in those intervals between business hours which most men appropriate to recreation or rest.

While I was proof-reading the first Chapter of this work, a remarkable paper by Mr. PERCY W. BUNTING, editor of the Contemporary Review, was being read at the great Ecumenical Council of Methodists held in this city, which sharply emphasizes the views expressed in that chapter, and marks the opportuneness of the general arguments and con-

clusions herein submitted. For without attempting to analyze or test a single one of the contentions of Evolution, it broadly accepts the general doctrine, and endeavors, if not to accommodate the philosophy of the Christian Religion to it, at least to show that there is no incompatibility between the one as taught by CHARLES DARWIN and HERBERT SPENCER and the other as accepted by the Christian Church generally. To show that such a conclusion is erroneous and such a concession dangerous, is one of the aims constantly in mind throughout these pages.

WASHINGTON, D. C., October 22, 1891.



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GENESIS OF LIFE AND THOUGHT.

CHAPTER I.

SCIENCE AND RELIGION—PREVALENCE OF MATERIALISM.

A RECENT writer remarks that “the pulpit and the people are honey-combed with heresy.” In May, 1879, the editor of *Popular Science Monthly*, wrote:

“There is an undeniable and widely-spread decay of theological dogmas affecting all classes of society. The old adherence to traditional beliefs is weakening, and men are falling away from their creeds. The ancient sphere of belief and faith is invaded by science and is being inexorably circumscribed.”

PROF. JOSEPH LE CONTE says :

“Materialism has thus become a fashion of thought ; and, like all fashions, must be guarded against. This tendency has been created and is now guided by science. Just at this time it is strongest in the department of biology, and especially is evolution its stronghold. The theory is supposed by many to be simply demonstrative of materialism.” (*Science and Religion*, p. 267.)

There can be no doubt of the correctness of PROF. LE CONTE’S statement. Science has been gradually growing more and more materialistic for the past thirty

years at least. During all this time Materialism has been aggressive and personal Theism on the defensive. And he is right when he says further:

"But we must not imagine that all the dogmatism is on one side, and that the theological. Many seem to think that theology has a *pre-emptive right to dogmatism*. If so, then modern materialistic science has *jumped the claim*."

In the long run, Religionists have had the worst of the argument, they have been forced into the attitude of apologists, while Materialists have, as PROF. LE CONTE says, become dogmatic and arrogant. Agnosticism has become the fashion amongst those making pretense to scientific culture. Tons of defensive literature have been poured out from the religious press, and the pulpit has everywhere been resonant with declamation against scientific unbelief. Yet it must be painfully evident to every believer in a spiritualistic system, who is at all read up in the literature of the subject, that no work has yet appeared satisfactorily answering the arguments hurled at Christian philosophy by scientific Materialism. So clear is this to the better informed classes of society, that it is having telling effect against the Christian Religion, not only with the votaries of science themselves but with literary people generally, and particularly with our thoughtful young people, even in the very precincts of the churches. Says DR. DRUMMOND: "It is recognized by all that the younger and abler minds of this age find the most serious difficulty in accepting or retaining the ordinary forms of belief. Especially is this true of those whose culture is scientific. And the reason is palpable. No man can study modern science without a change coming over his view of truth. What impresses him about Nature is its solidity. He is there standing upon actual things, among fixed laws. And the integrity of the scientific method so seizes him that all other forms of truth begin to appear comparatively unstable. . . . Its own doctrines, grounded in Nature, are so certain, that the truths of

Religion, resting to most men on authority, are felt to be strangely insecure." (*Natural Law*, p. 14). And DR. DRUMMOND'S remedy is to *carry natural law* into the realm of spiritual things. This is not the occasion to deal with the inadequacy of the remedy, except by pointing out the fact that he has not probed to the bottom of the disease. The proposition is, that to-day several of the great fundamental doctrines of popular Science are standing in irreconcilable hostility to the very basic principles not only of the Christian Religion, but of all personal Theism as well.

Says DU BOIS-REYMOND (*P. S. M.*, Feb., 1879, p. 421): "Final causes in nature are incompatible with nature's intelligibility. Hence, if there is any way of banishing teleology from nature, the man of science is bound to take it. Such a way is found in the theory of natural selection; and hence we must follow it.

. . . He sees that his field of research lies between the problems, 'What are matter and force?' on the one hand, and 'How do matter and force think?' on the other; outside of this field he knows only that he knows nothing, can know nothing, and will know nothing. Standing without vertigo on this mountain summit of Pyrrhonism, he scorns to people the vacuity round about him with images of his own phantasy, and surveys unappalled the unpitying drift of nature without gods."

And PROF. C. S. PEIRCE says: "But to the mind of a physicist there ought to be a strong presumption against every mystical theory; and therefore it seems to me that those scientific men who have sought to make out that science was not hostile to theology have not been so clear sighted as their opponents."

Now in such a conflict, one side or the other must be wrong: if the bald pretenses of theoretic Science as enunciated by DU BOIS-REYMOND are sustainable, personal Theism with all systems of religion resting upon it must go down. If a personal Theism is a verity, and the fundamental doctrines of the Christian

Religion are true, then Science must withdraw some of her most vaunted pretensions. It is an "irrepressible conflict." There is no avoidance from fighting it out to the end. Hence the pressing question is: If Theists and Religionists have truth on their side, why have they not made a better showing in the lists? Why have they been put to disadvantage in the discussion? Why are they forced to appear as apologists bearing white flags of truce? PROF. DRUMMOND says, because they are not scientific enough; they need more Science; they must seize the great truths propounded by modern scientists, carry them into their own camps, and make them bases of their own doctrines. I claim the exact contrary. We have too much science *of the kind*. What we need is a *better Science*, a Science confining itself to the *facts* of Nature; or, that, if trying the strength of its wings in the regions of theory, shall still keep a *tether to the facts* of existence. The defenders of Religion have accepted too much from Science. They have denied, and denied; but denied in the wrong places, often denied in ignorance, often denied *facts* upon which Science can stand impregnably. Facts are facts no matter from whence they spring. The attested facts of Science must be received with full credit. There is neither hurt nor danger in facts. The danger lies in *theories* received and used as *facts*. Science has propounded facts and theories indiscriminately, and theologians have accepted or rejected them indiscriminately. The output of scientific thought only needs a thorough winnowing that its golden grain may be garnered and its theoretic chaff scattered to the winds. "Defenders of the true faith" have signally failed to subject the wonderful outpour of recent scientific assertion to careful judicial tests.

In the very outset they have conceded away the foundation principles of the argument. Scientists have builded a broad and pretentious platform, not over well buttressed by truth; upon this, without critically examining its foundation stones, Christian

controversialists have mounted to do battle for their faith. The results are as should have been expected. They have been pressed back, and back, before the victorious banner of a materialistic Science, till they scarcely have standing room left. They are now forced into the apologetic corner, a position Truth should never occupy. Error may apologize, Truth should *never*. That apostle of Positivism, FREDERIC HARRISON, is not very far out of the way when he asserts, that, "Of all the foes of orthodoxy, philosophic theism and philosophic doubt are the worst. SPENCER and DARWIN stand outside, and Christians can answer them out of their Bibles and their creeds. But Natural Theology in a surplice, talking German metaphysics and modern science, is indeed a wolf in sheep's clothing." And on the concessions everywhere made, PROF. FISKE is correct in affirming, that "The Doctrine of Evolution has once for all deprived natural theology of the materials upon which until lately it subsisted. The apparent indications of forethought are just so many illustrations of the scientific theorem that Life, whether physical, or psychical, is the continuous adjustment of inner relations to outer relations." One might as well stand and whistle to the hurricane as to admit all the premises laid down by modern scientists and then plead for an open way for the admission of God into His own Creation. If those premises are true, there is no place for teleology, no place for natural theology, no place for Providence. They shut the door in the face of Deity.

True, PROF. LE SEUR says: "No scientific doctrine can by any possibility be irreligious." This aphorism can be made sound by substituting the phrase "scientific truth," for "scientific doctrine;" but as it stands it exhibits the mental habit which I am criticising. It is an assumption that all "scientific doctrines" are true, with an expectancy, that being true, they should be implicitly accepted by all. My point is, that being often untrue, the expectancy is *too frequently* and

too largely indicated in the teachings of theologians and Christian philosophers. Having accepted, without question, false premises tendered them by Science, they are then forced forward into false conclusions; or else, are tripped and thrown in a tangle of logical contradictions. They have had their eyes too fast set upon the stars to discover the nets spread for their feet. They have voluntarily, but unsuspectingly, taken, (*accepted* is the proper word,) positions in defense of the Truth, which are utterly untenable, which can never be vindicated.

It is now past fifteen years since the Editor of the *Popular Science Monthly* wrote: "There can be but one basis of substantial peace, and that is the entire indifference of religious people, *as such*, to the results of scientific inquiry." That was to say, if religionists will remain in "their shells," and placidly, if not rapturously, accept whatever proposition professed scientists in the name of Science may propound, there shall be *peace*; not otherwise. Some religionists have manifested an inclination to accept even these hard terms. But why might not "religious people" equally well have said, "If scientists *as such* shall show 'entire indifference,' to the results of Religious thought there can be *peace*?" The principal part of the trouble comes from the fact that specialists, having made reputations, and generally deservedly so, *as specialists*, think they have earned the right to set themselves up as authority in all branches of knowledge. An adept with the scalpel, or crucible, or microscope, imagines that this special training peculiarly fits him for weaving all manner of airy theories concerning the deepest problems of thought, life, and being, and publishing them "as one having authority." Now I would not suggest that skill in the manipulation of any instrument or pursuing any line of observation should debar one from the pursuit of any generalizations of philosophy, even the highest; but what I do insist is that the natural scientist has neither commission nor right to take pos-

session of the whole field, set up therein his idol hypotheses, and demand, as the price of peace, that all shall fall down and worship them at whatever sacrifice of faith. I deny that he is peculiarly the keeper of *all* truth, or of any truth for that matter, outside his own specialty, and not always there even. More than this, I charge that scientists have propounded as with authoritative right, a number of theories and demanded general allegiance thereto, as, and for, and in the name of established scientific truth, where other thinkers, if not equally likely to be proficient as they, are at least capable of detecting and pointing out their fallacies. The facts, the truths of Science, I revere as I do all truth, but a fallacious proposition from the mouth of a scientist is entitled to no more credit than from the mouth of any other.

TWO CLUES IN NATURE.

There are two clues leading all through the labyrinth of Nature, that, clearly distinguished and fastly held, largely save from philosophic error and guide to truth. These are *Intelligence* and *Will*, which constitute the very essence of a logical Deism, as do their opposites, *unintelligence* and *necessity* the essence of mechanical Materialism. Wherever intelligence and will are admitted the reign of Mind is conceded, wherever they are denied Mind is excluded and Mechanism conceded.

MR. E. P. POWELL well says ; "only the intelligent can work intelligently." If intelligent action or supervision is anywhere denied to intelligent work, it is the concession that such work may be done by *unintelligent* agencies or factors ; and if so in one instance, why not in all ? If a single product of Nature, showing adjustment of parts or adaptation to ends, may be the result of a fortuitous or necessary concourse of forces, why may not all be so ? If an idiot, blind and uninstructed, could make a pen-knife or a match-box, who could deny that he might fabricate a watch or a

type-writer? The very central and essential idea in intelligence is the capacity of planning, of doing, or of comprehending intelligent work. If such work can be either planned, done, or comprehended by *unintelligent* principles or factors, then intelligence loses its quality and distinction; and, when it is conceded that it has lost it in one instance, the whole argument is yielded; for the adversary may well and logically say, if intelligent work may be produced in one instance *without* intelligence, it may in all; if Mind may be excluded in one such instance it may in all; if Deism may be dispensed with on one such occasion it may on all occasions. So one such concession, however small, logically concedes all.

It was a maxim with SPINOZA that "Intelligence and will are one and the same." I do not accept this, but I do contend that *will* presupposes *intelligence*, is built upon it, cannot exist without it. So *necessity* is blind; it is incompatible with *intelligence*; it excludes it.

The two clues, *intelligence* and *will*, are, therefore, parallel threads; they run together through all the labyrinths of Nature; the severing of either at any point leaves the thinker at the mercy of non-purposive Necessity. Any concession that any of Nature's intelligent and intelligible productions are the outcome of either *unintelligent* or necessitated action, is a clear admission that all may be so, and that there is no logical reason for a purposive Intelligence anywhere; no logical room anywhere for a creative Deity. This analysis makes it patent than any defence of Christianity, or of Theism even, which makes concessions, to any extent whatever on either of these lines, is rotten at the very base, for it starts on false premises.

Yet where has one of all the adversaries of Materialism questioned the doctrine of the Conservation of Energy, which contains not a germ of either intelligence or will? How many of them have entered a protest against the doctrine of the *Immutability of Law*, which, in its very terms, excludes both *will* and *purpose*?

How many have recorded a doubt as to the doctrine of the mechanism of organic nature, where, of all else, intelligence and plan most clearly show forth? Have not many of them, following such lead as that of the brilliant HENRY WARD BEECHER and the venerable DR. McCOSH accepted, without rebate or discount, MR. DARWIN'S doctrine of Natural Selection, which is, itself, a masterly attempt to build and explain organic Nature without Mind and without Will, to show how she has evolved herself without purpose and without God?

True these men, many of them learned, able, and distinguished, all of them earnest and pious, were and are firm believers in a pure Theism; but, logically, they have not vindicated God's reign and rule, not even His existence; logically they have conceded away the grounds upon which He *may* be vindicated. For after admitting that organic Nature *has* been produced, *is* being produced, without mind, without purpose, without will, what answer can be returned to the Materialist who replies: "Yes, and so has all the rest. If all this can come of itself without God, so may all the rest. Therefore, I see no room, place, or need for a God. I accept nothing of the kind!" I know of no answer but simple faith—"I believe in God." This is comforting to the believer but not convincing to the doubter.

THREE POSSIBILITIES OF BEING.

The most elementary possibilities of being which can be assigned as bases for Nature are three, Chance, Necessity, and Purpose. PROF. BASCOM well remarks: "Accident has no law." Accident is uncontrolled by Necessity or Will. Nothing makes it to be. But purpose compels things to be, to appear. Purpose is shown by adaptation. Adaptation is where one thing is complementary to another, where one thing is fitted to support or aid another; or, else, where two things are fitted to mutually contribute to a

third. Now the ways in which one thing may be adapted to another are limited, few in number, while the ways of nonadaptation are infinite in number. It follows that the *chances* against two things being adapted to each other, otherwise than through purpose, even in a single particular, are as infinity to some small definite number; and, each additional particular adaptation multiplies the chances against a casual happening by an infinite number. So the adaptations everywhere seen in Nature put Chance out of all sensible question and leave the room entirely to Necessity or Purpose. Now if Necessity rules, it has to find its basis in one of the other two principles, either in Accident or Will. If it be said that Necessity rules without a reason dominant over all, it is equivalent to asserting that *this* way happened to be necessary instead of some *other* way; that it just happens that the present infinitude of order and adaptation in Nature is necessary instead of some other. But we have already put fortuity out of court. If chance cannot directly be the antecedent of a few or only one adaptation, assuredly it cannot be indirectly of an infinite series of adaptations. So Necessity without reason and law stands on the same logical trap-door of impossibility with Chance itself. The other basis for Necessity is Will and Purpose. Things are necessary because Will wills it so. It is not that Will *must have* willed it, but because Will *does* will it so. That is to say, Will and not Necessity is dominant. Will is superior to Necessity and not Necessity to Will. Necessity grows out of Will and not Will out of Necessity. Then the exclusiveness between Will and Necessity is between the dominance of the two principles. Both cannot be supreme; one may be supreme, the other must be subservient. But, as we have seen, supreme Necessity means *accidental* Necessity, and accident is impossible in a world of adaptation and adjustment. Only Purpose could fashion two or more objects into harmony and fitness to each other. Should accident make a mortise

the chances are as infinity to one that it would never prepare a tenon to fit it. Purpose having made a mortise, readily fashions its tenon to it.

PROF. SHOUP says ; " Nobody ever yet saw anything done, that is a purposive end accomplished, *when he was in the secret of the doing*, in which he did not know a personal element to be present. Iron and brass and wood do not rush together and form a steam-engine, but they are consciously combined by a thinker ; and so of every possible contrivance. If it be answered that this is not true in the process of nature, the obvious reply is that that is the very point in issue : that it is a pure assumption, in the face of all analogy, that there is no thought power by which its processes are directed. (*Mechanism and Personality*, p. 136.) And he might have added that the *chances* againstsuch an "assumption" being true are as infinity many times multiplied into itself, to one ; that is to say, to human reason it is absolutely impossible that such should be the case either on the hypothesis of direct Chance or on that of fortuitious Necessity.

SCOPE OF THE ARGUMENT.

If I am right in the views herein expressed, the imperative duty of the hour is a critical and exhaustive examination of the very bottom principles of thought and being, in order to the recovery of the concessions inadvertently made ; and that a defense of spiritualistic doctrine and philosophy may be accomplished in logical form from an impregnable basis.

In a prior work, " *Genesis of Nature*," I have attempted to show the illogical and inadequate results arising from the generally accepted doctrine of the "Conservation of Energy," particularly that it underlies and compels a purely necessary and mechanical philosophy of the universe ; and, further, that the evolutionary system of MR. HERBERT SPENCER,

being admittedly founded upon it, must share its fate in analytical discussion. In this work I shall attempt, as indicated, to follow the two clues mentioned above through some of the more patent intricacies of Nature, comparing and contrasting the two systems, mechanical Necessity and intelligent Will, outlining and demonstrating the absolute and irreconcilable contradiction between them all the way through the phenomena of Life and Thought ; and showing, with what strength of reasoning I may command, that Purpose, and not Necessity, is the dominant principle everywhere in Nature. For the rule of Purpose means not only a personal God but a personal human soul, while the reign of Necessity means no God ! and no soul !

It seems to me that right here is given to the earnest thinker the most sacred of all trusts : a commission to go forward regardless of all omens of ill and warnings of timidity, with balance, and measuring rod, and such light as he may carry, and such strength as he may command, into the deepest depths to do his little share in distinguishing and grouping, weighing and measuring, those foundation principles out of which spring all the phenomena of Life and Mind, Thought and Feeling. It seems to me that of all others he cannot afford to tolerate glosses ; he should not wait to dally with prejudices ; he may not stop to study the face of consequences ; that his true mission is not the defence of system and dogma but the *exposition of truth and error*. Good-natured critics have advised that it is an unsafe thing for Christian faith to question scientific conclusions ; accepting the infallibility of scientific systems and theories themselves, they would impose like intellectual shackles upon all others. Particularly do they consider it brazen assumption for one who has not held some distinguished professorship to entertain opinions, or at least to publish opinions, not stamped with the seal of current scientific orthodoxy. So it was long held presumptuous for philosophic inquiry to meddle with

theologic dogma. But in the end, all truth must be true, and all error erroneous, no matter under what category classed. No truth should ever be deemed too sacred for sifting, no error too sacred for exposition. The truly scientific method, the only logical method, is to "Try all things and hold fast that which is good." Doctrines may suffer and systems may topple. But what of that? What does that concern the earnest delver for immutable principles in the mines of truth? Where the roots of systems are planted deep down on the everlasting granite he will dig around them in vain; where, underbedded by strata of sand, the sooner they topple to their fall the better.

With not a few authors there seems to be a disinclination to dig down to bottom principles lest unwelcome truths should be exposed. Many prefer to expend their energies in fortifying rather than in testing accepted doctrines. So it has been pre-eminently with Conservation of Energy. It was accepted without question in the first instance, "slid into acceptance," as Prof. Tyndall aptly remarks, and all the literature on the subject has been written to prove it! none to test and try it. So, very largely, it has been with Evolution. Scientists, making haste to receive it, have ransacked the accessible universe for supporting facts, while, with very many of them, refractory facts have been ignored or glossed over. (However, MR. DARWIN himself was not liable to this charge, and MR. ST. GEORGE MIVART is a notable exception amongst living evolutionists.) Too long already have these and other illegitimate or illy considered theories, put forth with all the eclat of scientific discoveries, tyrannized over the minds and wrenched loyalty to truth from the hearts of men. It is time there should be a reckoning; time that Science should be called upon to vindicate her assumptions; time she should be made to prove those theories which have merely "slid into acceptance;" time she should be taught that her peculiar domain is the realm of facts, (where indeed her won-

derful accomplishments ought to be fully satisfying), while in philosophy her votaries have no warrant to assume greater authority and prestige than thinkers from other walks of scholarship; time for her to learn that liberty of thought and investigation is no more to be chained to the chairs of professorships than to the pulpits of sectaries.

A sentiment extensively prevails, that if, on the face of one's system the outlines of correct doctrines can be discerned, it matters not what amount of error may lurk in the foundation principles builded upon. But this is a dangerous aspect of credulity, since the important question is not what a writer's theoretical beliefs or ostensible opinions may be, but what are the tendencies of the doctrines he promulgates or into what outgrowths do his first principles logically lead? For while superficial minds may be content to build upon the surface of his philosophy, deeper thinkers will give little heed to any contradictory beliefs with which he may beguile his own fancy or seek an alignment with current theories. On the contrary, they will start with his bottom premises, and so far as they have ability, educe their own doctrines as compelled thereby.

While Truth, and not dogma or creed, should be the goal of every candid thinker, this should appear in his method, not in his results; for no one can think earnestly, logically, and deeply without reaching positive conclusions. The dogmatist *starts* with conclusions, and reasons back to find supporting evidence. The logical method is to start with first principles and reason forward towards conclusions. That one has positive convictions is not, therefore, as some seem to think, a necessary sign of prejudice or superficiality; but on the contrary, it is what should appear as the end of all profitable investigation. The writer does not, therefore, pretend to be without earnest convictions on the questions outlined for discussion in this work, and what these convictions are may be thus concisely stated: a purposive, creative Deity; an in-

telligibly created Nature; and a personal, volitional human Soul: also that the principles of Ontology, Biology, and Psychology, properly understood and interpreted, vindicate and demonstrate these doctrines, in the face of a mechanical and necessarian Materialism. I believe that to find this last proposition true it is only necessary to go to the first principles of thought and being, and, accepting nothing from Science but her demonstrated and established *facts*, build up with discriminative and rigid logic to the highest plane of phenomenal Nature. Such is the intended scope of this work. As to how nearly the author has reached, or how far he has fallen below the attainment of this aim, the reader who follows him in thought must judge.

CHAPTER II.

ANALYSIS OF TERMS.

VERY much of the divergence and misunderstanding in philosophical discussion arises from an indefinite use of terms. Quite a number of words in constant use in scientific and metaphysical literature are overloaded with distinct and sometimes contradictory meanings, and each writer is apt to attach to them the meanings most suitable to the exposition of his own views; so it sometimes happens that two writers discussing the same subject and using the same terms may mean to assert diverse propositions, or using different terms may be aiming to reach the same conclusions. It is thought well in the outset, therefore, to give an analysis of a few of the terms that will necessarily be used in this work.

In doing this it will be found convenient to enter into the discussion of several principles with considerable particularity, preparatory to the consideration of the more prominent issues of the argument before us.

THE ABSOLUTE.

This term may mean the Infinite, the Primary, the Unrelated, the Unmodified, the Real, the Independent, the Actual, the Self-existent, the Necessary, or the Complete ; and possibly, it may sometimes be used in other senses yet. Several of the above definitions are very close together while others of them are far enough apart. Sometimes it carries nearly all these meanings ; and often it is used, as a mere abstraction, that is, to denote an aggregation of qualities without substratum of existence behind them. This is apt to be so, where an author having no definite notions concerning the first principles of things, is still not content to be silent. Perhaps no word stands for more in filling up vacuity in metaphysical argument.

PHENOMENAL.

This term is found in use with meanings the opposite to most of those given for the Absolute. It should properly be confined to the apparent. *Phenomena* properly means the appearance of things as presented to the mind, which may or may not be the same as the reality itself of such things. Indeed there is a sense in which we can never be absolutely certain whether we can ever know more than the appearance of things. This is set forth by PROF. SHOUP in the opening chapter of "*Mechanism and Personality*" more graphically than by any author I know. MR. SPENCER's Theism is founded on the absolute *unknowability* of anything save appearances.

THE RELATIVE.

J. S. MILL remarks that "Relative and Relation are vague words admitting of a great variety of meanings." Between any two existences there *must* necessarily be at least *two* relationships, those growing out of their occupancy of space and of time ; and there may be innumerable others, so that, in fact, the number of

relations between any one object and all the other objects in Nature must be practically infinite ; therefore, there are very few other words which cover so much ground or may mean so many different things ; for this reason, it is a word in great request in philosophical discussion, since almost any vague notion can be hidden behind it. MR. MILL says : " Relative is an abstract name for all concrete facts which concern more than one object." But some physicists go to the extreme length of making all existence a relationship ; of saying that outside of relationship there can be *no* reality. Even so close a thinker as JUDGE STALLO, steeped in the philosophy of HEGEL, takes this position. Says he : " The annihilation of all bodies but one would not only destroy the *motion* of this one remaining body and bring it to rest, as Prof. Neumann sees, but would also destroy its very *existence* and bring it to naught, as he does not see. A body can not survive the system of relations in which alone it has its being ; its *presence* or *position* in space is no more possible without reference to other bodies than its change of position or presence is possible without such reference." But JUDGE STALLO here takes the false step of logically confusing and confounding the processes of thought with thought-existence itself. It is true we can not in thought fix the *place* of a body without reference to other bodies, at least two, but it does not follow by any means, that because we might not have been able to fix its locality in space, a body *had no locality*, much less that it had *no existence*. I insist that there is nothing logically in the way of imagining all other bodies than this Earth annihilated without in thought extinguishing her also. True, we may argue that in such case she would lose her seasons, lose her light and heat from the sun, lose her present adjustment of motion ; yet I contend that there is no known valid reason, either physical or metaphysical, why she should not continue to exist. Relations do not make things, they are the attitudes which things bear to each other. Each existing body

has an attitude, that is a relation to every other in existence. The theory is that relationship is the essence of existence and a body can not exist if deprived of an essence of being compounded of at least three relationships (JUDGE STALLO says five, but I think three will do). Now does it not seem that if three or five relationships can constitute the being of a body that the more relationships it would possess the *more being*, the *more existence* it would have? And ought not the coming into being of any new body to be a creative factor of innumerable other new bodies since it brings with it innumerable new relationships? It may seem a waste of space to controvert a doctrine so antagonistic to all ordinary logical thought, but when an error of such dimensions is put forth by so keen a metaphysical as well as physical reasoner as JUDGE STALLO, it is not safe to pass it in silence. For the logical outcome of the theory is the annihilation of all causality.

EXISTENCE.

Existence is whatever *is*. It is being in the largest sense. It is the whole of the real. It is all the *fact* of Nature as distinguished from its phenomena. It contains those forms of being which are unsusceptible of analysis. It is divisible into two classes under all the meanings assigned to the Absolute and its contraries. The first class may be thought of as capable of change, of beginning to be or ceasing to be. We can imagine a universe in which they are absent. There are four categories of this class mentioned in various philosophical systems: Mind, Force, Matter, and Motion. However, some philosophers, as we shall see, dispense with Mind, some with Force, some with Matter, and I think Motion should not properly rank as a category of Existence. The other class includes Space, Time, and Number. These can not be thought of as beginning to be or ceasing to be. No universe can be imagined with these absent. They are with-

out exception admitted as real and genuine categories. In one sense they are forms or moulds to all the other categories, since they are the *media* or containing environment of all the others, in which their existence is submerged. All things else are *in* Space, and Time, and Number, something in a manner best illustrated by a fish *in* the sea, or a bird *in* the air.

NUMBER.

Number is undefinable because there is nothing else like it. It is entirely unique and stands apart from all the other categories. It has no substance, no essence, is not in any sense an entity. It does not occupy Space or Time. No other category enters into it as an element or component; yet, in a manner, it modifies them all. It is in its nature to be applicable to them all. In itself it is entirely abstract. It is made concrete in its application to the other categories. The nearest to a definition that can be found for it is *Unity and Repetition*. This in the abstract. When the *unit* is taken from some of the other categories it becomes concrete. When the unit is taken in Space, Number becomes Geometry, when taken in the other categories, Arithmetic. If the unit is an assignable quantity we have the Mathematics of finite numbers; if the unit is less than any assignable quantity we have an Infinite Series.

It is the peculiarity of Number from which it takes its rights to be ranked as a category of existence, that, having taken or *assumed* its unit from the other categories, it is henceforth entirely independent of them, it can become absolutely abstract and reach the results of its calculations as though there were no other categories. Hence the office and sole office of Mathematics is to determine the *numerical* and *spatial* relations of the other categories, and it cannot be properly invoked in the determination of any other relations or modifications of Existence.

Philosophers from PYTHAGORAS down have been apt to make too great a factor of Number in their systems. M. COUSIN and MR. SPENCER particularly, make a great deal out of the antithesis of unity and plurality. Their results, as it seems to me, are largely drawn from an obscurity of thought consequent upon a vague and indefinite use of the term *plurality*. They seem desirous to make, in some way, these ideas of *unity* and *plurality* integral components of the other categories of existence; but this they in no sense are nor can be made to be. This error is very closely related to that of the mathematical scientists who would make Number in its relations, (Mathematics), a determining condition of all modes of Existence, stretching it outside its domain into the demonstration of other phases and modes of being and the relations of other phenomena, thus engendering a vast amount of philosophical error.

SPACE.

Space and Time are in some respects analogous, but each is unlike anything else and both are undefinable. Space is not a substance, not an essence, not an entity, not a power, not anything tangible; and yet it is a very real something, an existence with properties, and modes; and, independent in that it would be what it is were there no other existences. Its modes are four absolute, the Point, Line, Surface and Volume; three simply relative, Position, Direction and Distance, and two relatively complex, Shape Form or Figure, and Dimension or Size. The *Point* is without extension or dimension; that is to say, it is infinitely small. It is a fixed place in Space and is just what it is and where it is absolutely and irrespective of all other Points, modes of Space, existences or relationships. The Line is Space extended in one direction. It has one dimension, length, but is without width or thickness. It is infinitely attenuated. It is sometimes said that the Line is made

up of an infinite number of Points, but PROF. CLIFFORD has shown that this is an erroneous view; for, as the Point has no dimensions, no size whatever, an infinite series of Points cannot attain to even the smallest dimension, cannot make up even the shortest imaginable Line. The Line is dimension in one direction, between terminal Points, and passing through an infinite series of Points; or, as PROF. CLIFFORD would have said, perhaps, through a *doubly* infinite series. Now as any two Points of the whole infinitude of infinite series of Points in Space, may be the terminal Points of Lines, it follows that the number of Lines in Space are equally infinite with the number of Points. Aye, more. Between any two Points there may not only be one right Line but also an infinite series of Lines of infinitely various curvatures passing through infinite series of Points bearing every possible direction from each other. It follows, therefore, that since every Point is an absolutely fixed place in Space, so every possible Line must be an absolutely fixed path independent of all other modes of existence save the Points which it connects and through which it passes.

A *Surface* is dimension in two directions but without thickness, that is, it is infinitely thin. It is bounded by Lines. The like reasoning as pursued with the Line shows that in Space, Surface is an infinite series of infinitely various curvatures, and that it is absolutely fixed and stationary irrespective of all else than the lines which bound it and the Points through which it passes.

Volume is dimension in three directions, or it is the content of a Surface returning upon itself; that is to say, it is a portion of Space bounded or marked off in every direction by Surface. It, too, is absolutely fixed and stationary irrespective of all else save the Surface which limits it.

Position in Space is a Point, Line, Surface, or Volume considered relatively to other Points, Lines, Surfaces, or Volumes. Absolutely, Positions are fixed places, but relatively they vary.

Direction is the Position of any Point relative to two other Points. This is the basis of all angular measurements and of the science of Trigonometry. There is nothing *absolute* in Direction.

Distance is the amount of separation of two Points measured by some linear unit.

We may speak of the *Shape* of a Line. It means the path in Space or relative Positions of the Points through which it passes. The Shape or Form of a Surface depends both upon the Shape or Direction of its boundary Lines and the curvatures, if any, of Lines within its contour. The Shape, Form, or Figure of Volume in Space, or of a *Body* occupying Space, is wholly dependent on the Shape of the Surface which contains or bounds it.

The *Size* or Length of a Line is indicated by the number of times it contains the measuring unit. The Size or area of a Surface depends partly on the number of measuring units contained in two directions and partly on the Shape or curvatures of the Surface. So the Size or solid contents of a Volume in Space, or of a body, depends on the measure in three directions as well as on the Shape or curvatures of the containing Surface. The Line, Surface, and Volume are but provisional or conceptual modes of Space; that is to say, there are no such actual modes marked out and defined except where occupied by bodies. There is only a *whereness* in Space for such modes. Also, neither the Point, Line, Surface nor Volume can move: only bodies can move and in moving they occupy these several modes successively in different places. When a missile is hurled through Space it does not carry any portion of Space with it, but it continually occupies other places, that is other Volumes in Space. It moves out of a piece of Space of its own shape and dimensions into another piece of like shape and dimensions; and so on continually so long as the motion lasts.

Another important consideration is that every point in Space is cut by lines and surfaces, and con-

tained by volumes in an infinitely numbered series in every one of an infinitude of directions, shapes, and dimensions ; so, that all Space is literally packed and crowded with lines, figures, and volumes in infinitudes upon infinitudes of number, shape, direction, and size, and therefore, cutting each other at every point and in every direction. All this as explained above only conceptually, only *where* and *how* lines, figures, and volumes *might* be drawn or marked out, only *where* and *how* Space *is* or *might be* filled out by bodies.

These properties or modes of Space give us the science of Geometry, which is *abstract* while applied to Space and its properties only, but becomes *concrete* when applied to *bodies*. But all its theorems and equations may just as well be formulated, tested, and wrought out in the abstract as in the concrete ; for, every one of them would be just as certain, just as true, and just as positive, were there and had there never been any *bodies*, any matter in existence. Aye, so far as we are able to comprehend the subject, they would all have been just the same had there never been either mind or matter in existence. They seem to be absolutely independent and self-existent by their very constitution. It follows from these views that the modes of Space and principles of geometry are not created, produced, or invented by Mind ; but only discovered, and connected by the intellect of man. They are every one pre-existent ; they are only lifted to light in thought. They are found as they exist in the abstract and given thought-forms. They are *facts* in existence, *thoughts* or *ideas* in the mind. So PLATO was not so far wrong ; only they are not entities, not tangibles either-where, only *facts* on one side and *notions* on the other.

Nor is it *different* when we go from the *abstract* to the *concrete*. Body simply fits into these modes of Space, simply conforms to and fills out some of these existing geometric facts. Thought only discovers and marks this as in the abstract. It constructs nothing.

PROF. BASCOM says: "Space has no independent being. It borrows its reality from the reality of that which it defines." DR. W. T. HARRIS says: "Space is a necessary idea. We may think this particular object or not—it may exist or it may not. So, too, this particular environment may exist or not, although some environment is necessary. But space must exist whether this particular object of environment exists or not." JUDGE STALLO says: "Space is a concept, a product of abstraction. Space has no properties." MR. SPENCER says: "A consciousness of space is a consciousness of co-existent positions. That which we know as space is purely relative." There can be no question that DR. HARRIS's definition is right. It is the only scientific view. The others are only metaphysical abstractions, right or wrong according to the point of observation.

PROF. SHOUP says: "It is seriously questioned as to whether space is an objective entity or not; that is, as to whether it belongs to the thing-world or to the spirit-world." That is to doubt whether space is a category or mode of existence, a reality, or only a phase of mental phenomena; it is to question whether it is not manufactured in and by the mind. I think any such doubt wholly unphilosophical and spurious, for we can neither annihilate Space in thought nor think any other object whatever out of Space. It is not legitimate, I think it is not true, to say we doubt the existence of that which we can not help thinking, can not unthink, can not destroy in thought. PROF. SHOUP also says: "We cannot think of space as a *prius*, existing independently, and of things as afterwards made to fill it." This notion I think entirely wrong. I believe we do think Space "existing independently," else how can we think distance between separate points or bodies? or the interior of hollow bodies? or the Space in which bodies are submerged? It is true we think *definite* Space as between limits, as bounded; and, it may be as HAMILTON held, that we always think these limits as things or

bodies ; but granting so much it does not carry with it the negation of the "independent existence" of the space so bounded in thought. Much less will it bear with it the denial of "independent existence" to that space which, as we shall presently see, necessarily and invariably arises in thought beyond any utmost bound we may in imagination mark for it. I think that without a doubt PROF SHOUP has suffered a reversal of the true order of thought in his mind as regards space and body, for he approvingly quotes LOTZE : "Things do not exist *in* space, but space exists *in* things." In one sense Space exists *in* things, that is in bodies, for all bodies have superficial contours within which is both body or thing and Space co-extensively filling out the surface—bounded contours. Here Space may be said to be in the body or "thing." But to say that a "thing is not in Space ;" that the world, for instance, is not in Space is to my mind a most palpable absurdity ; it is to talk nonsense ; it is to deny one of the universal and extreme facts and conditions of human thought ; it is to stultify human reason right down on the ground-floor. It may be true that thought-things or bodies are the means or instruments by the use of which the mind accomplishes thought-space ; that were there no existing things for the mind to grasp in thought, or if it had not the capacity of grasping things in thought, it never could attain to the conception of Space. It may even be true, though I doubt it, as stated by JUDGE STALLO : "We cannot mentally evacuate space of all its contents, and have in the mind, or before the mind, the form or image of pure space : On the contrary, the idea of space is invariably associated in consciousness with some definite quality of sense. When we attempt to bring space before the mind in its visual aspect, it always appears in synthesis with a mental reproduction of some sensation of color however faint." (*Modern Physics*, p. 233.)

But as M. COUSIN showed, more than sixty years ago, in a most masterly argument, this is a very different conclusion from the proposition propounded by PROF. LOTZE.

It is true that we cannot fully comprehend the essential character of space ; but no more can we of any other existence as Time, or Force, or Matter ; as PROF. SHOUP has himself well shown. But the fact that we cannot fully comprehend the whole nature of any existence is no good reason for inverting and beclouding what we may know of it. We know Space as a “ somewhere-ness ” which is everywhere, and to which we can in thought set no fixed limits. As we think it, it includes and surrounds everything and everywhere ; there is no place, no point where it is not ; no possible thought creation can be lifted out of it or set beyond it.

We have, then, Space absolutely full, crowded, and packed with the pre-existent and self-existent *facts* of extension, form, figure, and size ; and Body or Matter here and there occupying, fitting in, and filling out these *fact-modes* of being : and then we have Mind grasping, recognizing, comprehending, these *fact-modes*, in the abstract or in the concrete, as the case may happen, and, interpreting them into terms which we call thoughts, notions, ideas. In all this Mind originates nothing, invents nothing ; it only makes itself receptive to take and utilize the eternal and necessary *abstract* facts as well as the phenomenal and contingent concrete facts which press in upon it from every side. The products of sensation, the sensational element in thought, may be regarded as the unital starting points, the counters of all thought-Space, the fulcrums which the mind uses in getting a pry on to Space ; nevertheless, as M. COUSIN puts it, although sensation may be thus chronologically antecedent to thought-Space, it is the logical-subsequent ; because we can think the discontinuance of all sense objectivity, but not of space. In thought-processes which philosophers are too apt to confound

with thought-elements, space appears as a containing mould in some of whose infinitudes of eternal forms all sense-objectivity is cast; while sensational thought itself appears as reflecting points, revealing the containing and contained space. In *thought-processes* the two elements are thus indissolubly conjoined but in *thought-results* they are independent, except in the single fact that things occupy Space, that is fit into and fill out certain of the numberless and eternal forms or moulds of Space which are always open to this use.

PROF. SHOUP says: "Time and space, then, taken together, are the presuppositions *or ground* of all things."—Dropping out the words which I have italicized this is correct, for all things exist or occur in both Space and Time: the existence of things logically, though not chronologically, pre-supposes Space, while the occurrence of events, logically but not chronologically presupposes Time.

TIME.

Time, like Space, is without substance, essence, entity, or power. It is intangible though very REAL in the sense of actuality. Time is naturally divisible into the Past, the Present, and the Future. It is also subject to artificial divisibility by the succession of events, as into day and night, summer and winter and they fall into the natural divisions of Past or Future or partly into one and partly into the other covering The Present. It has no modes. All artificial divisions are limited by, or rather at, the occurrence of the events which bound them off. Considered as wholes, the Past is limitless in beginning, and the Future in ending, but both are limited by the Present, the former in ending, the latter in beginning. The Present is limited both in beginning and ending, and may be considered as compressed into infinite thinness between the Past and the Future. Time as a whole is infinite

in both Directions, that is, it is limitless both in beginning and ending. Time with its modes are necessary and independent *facts* of existence, as I have argued in regard to Space. Mind distinguishes but cannot dominate these modes.

PROF. SHOUP says: "Time is the logical ground of change." This is hardly a correct conception. All change is in Time, cannot be out of Time, yet in no other than a containing sense can Time be said to be the *ground* or cause of *change*. More correctly he says: "The time-object is an event." Events are the thought-markings on the measuring rod of Time. Considering the thought-process and not the fact-existence itself, he is right in the further statement: "The environment of an event is that which precedes or follows. An event can only be limited by an event." This is the *way* the mind works, the way it uses its machinery to get hold of both *events* and Time; but we must beware that we do not suffer the *processes* of thought to slide down and occupy the place of the *elements or facts* of thought. For we not only think events in time, as we think things in Space, but we think them, when not coetaneous, as *separated* by Time as things are separated by space. PROF. SHOUP says well: "Space and Time are, as the mathematicians say, incommensurable, they have no common unit. No possible effort of thought can find a passageway from time over into space, or from space into time." Nevertheless, Time is the enveloping mould of events as Space is of things; and more than this, events occupy both Time and Space as things occupy both Space and Time. Events can not occur without occurring *somewhere* as well as *sometime*, and things can not be without being *sometime* as well as *somewhere*. But the manner of the occupancy is different in each case. While an event must occur, somewhere, have some locality, it does not fit into and fill out any particular pattern as does a thing; and while a thing must exist if at all

in or during some period of Time, it does not mark the progression of time. Measuring-rods for Space are things; for Time, are events, changes.

MATTER.

Idealists eliminate Matter from the categories of existence. BERKELEY, HUME, FICHTE, SCHELLING, and HEGEL make it a condition or projection from or determined by Mind. BOSCOVICH, followed by FARADAY and other scientists and philosophers, make it a composite of points or centers of Force. PROF. BASCOM is of this opinion. According to MR. SPENCER it is a mode of the Unknowable; that is, of Deity. HAMILTON's doctrine of causality leads to the same conclusion. Most modern scientists consider matter a substantial concrete existence made up of absolutely discrete external atoms." JUDGE STALLO seems to make it a mere relation between different centers of persistent forces, or rather of different centers of velocity. PROF SHOUP says, "We do not know what it is; we only know its effects." J. S. MILL says: "The notion of neither Mind nor Matter is anything but a permanent possibility of feeling. * * * Our conceptions of Matter come ultimately to consist of Resistance, Extension, and Figure, together with miscellaneous powers of exciting other sensations. * * * * Our idea of Matter is a Resisting Cause of miscellaneous sensations." But these are all merely metaphysical aspects of the subject, the discussion of which is not now in order.

As presented to our intelligence for analysis, the properties of Matter are Extension in or occupancy of the forms of Space, giving as sub-modes, Volume, Size, and Shape; Inertia, giving the sub-modes of Rest, Motion, and Resistance; and Mass, giving the sub-modes of Momentum and Weight. In a narrow sense, as we have already seen, Matter occupies Time also. HAECKEL, TYNDALL, and many other phys-

icists assign another property, Life, to Matter. BUCHNER and others even go so far as to confound Mind and Matter, giving sentiency to the very atoms of Matter. All these real or supposed properties or modes of Matter will be considered in due course.

One property of Matter, Inertia, requires a little attention here. PROF. SHOUP thus speaks of it : " In the world of inanimate things, we never think of one thing acting upon another, without being itself first acted upon. A stone would lie just where it is forever, if not disturbed by some external energy. It is inert; and this principle is the fundamental postulate of mechanics—NEWTON's first law. It is the principle of Inertia.

" It is important to get a clear notion of what is meant by Inertia. It is the property of matter by which change is resisted, with respect to either rest or motion. It is thus always in the opposition,—its voice an eternal 'Nay !' It is the all-pervading recalcitrant factor of external nature ; and just for this reason, the conserver of the material Universe. But for inertia nothing would lie still, and nothing could move, since a breath would move the world, and a breath would stop it when in motion. It is the one necessary condition of matter." (*Mechanism and Personality*, p. 187.) Now I consider this an altogether erroneous notion of Inertia—a word representing two slightly different principles. The first is the mere capacity in Matter of being acted upon by Force. The second meaning is more recondite. Every material body is at any moment of time in motion in some particular direction as the resultant of certain compounded forces acting upon it. The persistency with which it maintains its course is its momentum and is measured by the product of its mass into its velocity ; that is to say, of its mass into the resultant of all the forces at the moment acting upon it. Now Inertia is another expression for the same thing ; it is simply the persistency with which the body refuses to be turned out of its course by an extraneous force. The earth's

Inertia is simply its obedience to the forces which drive it through space. The Inertia of the stone, mentioned by PROF. SHOUP, is its obedience to the forces acting upon it, or the resultant of them, rather ; gravity holding it to the ground, rotary motions carrying it around earth's axis, and orbital motion carrying it around the sun. Inertia is the persistence with which it yields to the resultant of all these forces and resists any new force. Should all these forces loose their hold on it, it would then be subject to any other force, even to a "breath."

MIND.

PROF. FISKE says: "Thus we are led to infer as the ultimate unit of which Mind is composed, a simple *psychical shock*, answering to that *simple physical pulsation* which is the ultimate unit of nervous action. By the manifold and diverse compounding of myriads of such primitive psychical shocks, according to the slight structural differences of different nerves, are formed innumerable elementary sensations, which appear to be generally different Carrying still farther the same process of differentiation and integration, we rise step by step to perceptions of greater and greater complexity, to conscious classifications and to reasoning in its various forms. . . . Thus amid all their endless diversities, we discern, though dimly, a fundamental *unity of composition* through all orders of psychical activity.

And again : "What we call mind is a series of phenomenal manifestations." (*Cosmical Philosophy*, Vol. 2, p. 131).

BUCHNER says : "Mind is nothing more than a collective word and a comprehensive expression for the whole of the activities of the brain." E. P. POWELL says : "Man is not a double composed of body and soul, but a substantial unit." MOLESCHOTT says : "The times are gone by when man dreamed of a spirit independent of matter." DR. ALEXANDER BAIN

says: "The arguments for the two substances have, we believe, now entirely lost their validity; they are no longer compatible with ascertained science and clear thinking. The one substance, with two sets of properties, two sides, the physical and the mental—a *double-faced unity*—would appear to comply with all the exigencies of the case." (*Mind and Body* p. 196). "Thoughts stand in the same relation to the brain as bile does to the liver."—*Karl Vogt*. "Thought itself is a process and the mind a complex series of processes."—*Chauncey Wright*. "Both Life and Mind are processes."—*George Henry Lewes*.

"Mind is a series of feelings with a background of possibilities of feeling. But we are obliged to complete the statement by calling it a series of feelings which is aware of itself as past and future, as having memory and expectation, which gives us the alternatives of thinking Mind as a series of feelings which can be aware of itself or as something different from a series of feelings. . . . The wisest thing we can do is to accept the inexplicable fact without any theory of how it takes place.

"Without the notion of Not-self we cannot have the notion of Self which is contrasted with it. . . . No single sensation can suggest personal identity." (*John Stuart Mill, Essays on Hamilton*, Vol. 1, p. 262).

DR. PAUL CARUS says: "The organized totality of deduced facts, as it is developed in feeling substance, is called mind. Feelings are the condition of mind. From feelings alone mind can grow. But there is a difference between feelings and mind. Feelings develop into mind, they grow to be mind by being interpreted, by becoming representative. Representative feelings are mind. Accordingly, we characterize mind as the representativeness of feelings."

"Although deduced facts are an interpretation of given facts, this 'interpretation' is not expressly designed. These inferences from given facts are not invented with a premeditated purpose; they are not constructed with foresight or intention. Deduced

facts grow naturally and spontaneously from given facts, which are the elements of sense-activity. There is not an agent that oversees their fabrication ; there is not a devising ‘ subject ’ that surmises the existence of external facts and thus matures their conception into deduced facts. Deduced facts are rather the natural product of a certain group of given facts. Deduced facts issue from a co-operation of a number of feelings. They are the result of an organization of certain repeated sense-impressions which produce a disposition not only to receive sense-impressions of the same kind, but also to re-act upon them in a certain way. Mind is not the factor that organized the given facts of mere sense-impressions so that they become representations. There was no mind as long as feelings remained unorganized.

“ Feelings acquire meaning ; and as soon as they have acquired meaning they are what we call ‘ deduced facts,’ representations—especially representations of external facts. Deduced facts are the elements of mind ; and mind is not their root, but their fruit. Subjectivity cannot originate out of nothing ; it must be conceived as the product of a co-operation of certain elements which are present in the objective world. In other words, the elements of the subjective world are features that we must suppose to be inseparably united with the elements of the objective world, which are represented in our mind as motions Feelings originate through a combination of elements of feeling ; and the presence of the elements of feeling must be supposed to be an intrinsic property of the objective world. The objective elements, the action of which is accompanied with the elements of feeling, arrange themselves, we suppose, into such combinations as display actual feelings, in exact agreement with the laws of molar and molecular mechanics. This, we must assume, takes place with the same spontaneity as, for instance, an acid and a base combine into a salt. Motions are not transformed into feelings, but certain mo-

tions, when co-operating in a special form, are accompanied in that form with actual feelings. . . . If the elements of feeling are throughout inseparably connected with the elements of objective existence, it must appear natural that wherever the conditions fitted for organized life appear, irritable substances will originate. We may fairly assume that feeling will arise on the cooled surface of a planet with the same necessity as, for instance, a collision between non-luminous celestial bodies will cause them to blaze forth in the brilliant light of a nebula containing all the elements for the production in the course of ages of a planetary system. . . . Feelings, in the course of time acquire meaning; they naturally and spontaneously develop mind. . . . Mind is the necessary outcome of a combination of feelings. . . . Feelings change into mind, they produce the subject which thinks. The subject is nothing underlying but rather overlying. It is the growth out of and upon feelings. It is the sum of many feelings in the state of organization. The fallacy of Descartes's dictum has been pointed out by Kant. The existence of states of consciousness, or the fact *cogito*, does not prove the existence of something that underlies the state of consciousness. It simply proves the existence of feelings and thought. There are certain sense-impressions, there are perceptions, there are ideas. . . . States of consciousness are nothing but the awareness or the feeling that is connected with certain perceptions and ideas. . . . The soul is an organized totality of representations in feeling substance employed for the purpose of reacting appropriately upon the stimuli of external things. As light originates out of darkness, being a special mode of motion, so feeling originates out of not-feeling. The not-feeling contains the conditions of feeling in a similar way as potential energy contains the potentiality of kinetic energy." (*Monist.* p. 67.)

It is thus seen that the Materialists eliminate Mind from the categories. They say what is called Mind

is but a mode or process of material action, or but a series of phenomena, arising out of material relations or the succession of events. DR. CARUS attempts an elaborate philosophical explanation of how Mind may be produced without Mind, of how an intelligent principle may grow up out of unintelligent principles. To begin with, he *assumes* an element of *feeling* co-existent and co-eternal with the elements of matter or the first appearances of motion, it is not clear which. And Mind is evolved out of these elements of *feeling* which first take on meaning and then spontaneously group themselves into Mind. Now aside from the fact that the explanation is pure hypothesis based on bald assumption, it is a remarkable instance of fallacious reasoning in several particulars. In the first place, to speak of *feeling* without some *subject* to *feel* is a contradiction in thought as well as in terms, since *feeling* is the recognized state, attitude, or relation of a *feeling something* towards some other *something*. Take away the *feeling something*, the subject, and *feeling* is an impossibility. In the next place *feeling*, as we know it, is predicated upon thought, conceptions, ideas, notions. It goes out towards what is imaged in the Mind. It presupposes thought and thought presupposes Mind. Mind, therefore, is a presupposition to *feeling* and can not have originated out of what presupposes it. MR. SPENCER remarks : "Mind as known to the possessor of it, is a circumscribed aggregate of activities, and the cohesion of these activities one with another, compels the postulation of a something of which they are activities." All of which is true but only half the truth. "Mind as known to the possessor of it" is much more than "a circumscribed aggregate of activities ;" it is a real personal something producing and circumscribing those activities, an *actor* as well as action, or rather *an actor in action*. Then again we not only "postulate a something of which they are activities," that is, reason to the fact; we do much more than that, we actually perceive and recognize that something,

we know it directly. LEON DUMONT says : "The *I* is a series of facts." It is that and much more ; it is "a series of facts," and also the *compelling cause* of such "series of facts." It is a personal, individual and continuous substratum or back-ground out of which such "series of facts" grow, in which it inheres, and by which it is produced. PROF. HUXLEY says : "Matter and spirit are the names for the imaginary substrata of groups of natural phenomena." But whatever may be said of Matter, Spirit or Mind is much more than this, much more than an "imaginary substratum ;" it is a *real* substratum ; a *known* "substratum of groups of natural phenomena" as such phenomena are exhibited "in the organized totality of deduced facts," of DR. CARUS.

PERSONALITY.

DR. CARUS says : "Feelings grow into mind by being interpreted, by becoming representative." Interpreted by whom? or what? Representative to whom? or what? Interpretation is an *intelligent act*, an *act of Mind*. It is no sensible use of language to talk of a representation to other than Intelligence or Mind because representation presupposes a capacity for recognition in something to which the representation is made. So both terms presuppose Mind and yet the effort is to show that Mind grows out of these processes. By the theory these processes make Mind and yet they are themselves possible only after Mind. Again, when feeling "takes on meaning," it must be meaning to something capable of "awareness," as DR. CARUS puts it, capable of *recognizing the meaning*. *Meaning* to the unknowing is meaningless. Here again is the presupposition of *something* possessing "awareness," of Mind. I maintain that there is no fallacy in DESCARTES's dictum, that the existence of states of consciousness *does* prove the existence of something that underlies the states of consciousness ; that to speak of states of consciousness without some

principle to be conscious, some principle to which such states belong, or in which they inhere, is a contradiction in terms, in thought, and in fact. States of consciousness, feelings, ideas, what are they? They are not real things, not any entities, not any *pieces* of matter, or force, or of spirit, not any motions, not any disparate existences of any kind, not things which can stand alone possessing independence and individuality. Then what? Evidently they must be *modes of something*, affections of *something*, must inhere in *something*, have some principle underlying them and out of which they proceed, some subject in which they find a bond of connection. Otherwise they would simply "lie around loose," piled in utter confusion. Without such a principle why should there be any continuity in thought or feeling at all? Why should one's thoughts of to-day have any connection at all with his thoughts of yesterday. There either is or is not such a connecting bond. If there is, it is the Ego, DESCARTES's *Cogito*, the *I* thinking; if there is not such a bond in which mental actions inhere, then thoughts and feelings are associated by accident, they fly around loose and fall into groups as they may happen; there can be no individuality, and no *person* can call any particular feelings or ideas his own. They are all simply shadows floating around in a mental atmosphere, the property of any upon whom they may happen to alight. All of which is absurd enough, surely.

But supposing it possible that "states of consciousness" could come into being and subsist without any personality back of them, that there could be piles, or successions, or congeries of ideas and feelings without any connecting bond or substratum, or any mind to think and feel, and still the great anti-Cartesian difficulty is not yet reached. There is an "awareness" of these states of consciousness. Something *recognizes* them. Something experiences them. Something knows them, or they would never be experienced, never observed, never known; and, therefore, never

discussed by philosophers. *Cogito ergo sum*; I think, therefore, I am. What does that mean? It means: There are thoughts, there is a consciousness of those thoughts, there is a consciousness that *I* think those thoughts; take away the consciousness of the thinking *I* and you take with it the consciousness of the thoughts which the thinking *I* thinks. The two are inseparable, elements of a single state of consciousness; they cannot be dissevered. Therefore *Cogito ergo sum* affirms the consciousness of the Ego in action of the Ego thinking as well as of the thought of the thinking Ego. If the Ego is not proven by consciousness, nothing is proven by it. If we doubt that consciousness testifies of the Ego we must doubt the whole of its testimony, we must doubt that we doubt and doubt that we believe, and MILL says truly: "Absolute skepticism in denying all knowledge denies none." And so SIR WILLIAM HAMILTON, "The facts of consciousness are to be considered in two points of view; either as evidencing their own ideal or phenomenal existence, or of evidencing the objective existence of something beyond them. The reality of the ideal phenomena it is impossible to doubt. . . . To doubt the reality of that of which we are conscious is impossible. The inward fact, the feeling in our own minds, was never doubted, since to do so would be to doubt that we feel what we feel."

I can remember hearing my grandfather tell of his frontier adventures when I was a very small lad. But by no possibility can I persuade myself that *I* experienced those adventures. I experienced the recital of them, nothing more. At the same age I had my own little boyish exploits. These *I* experienced. By no possibility can I persuade myself it was not *I* but some other boy who had these little adventures. I knew then that it was *I*, I have known ever since that it was *I*; every time the memory of them has recurred I have known that it was the same *I*, through all the long years. A thousand witnesses might be called to testify that it was not *I* but some

other boy, and still I should not, I could not believe them. I should still know that it was *I*. Now if consciousness does not prove the existence of the *I* in this case, not only away back in those boyhood days, and not only now, but all the way from then till now, how can any fact be proven? MILL says: "There is no meaning to the word Ego or I unless the I of to-day is also the I of yesterday." Again, I awake from an impressive dream. I may doubt the reality of the facts seen in the dream, I cannot doubt the reality of the dream itself, that is, of the occurrence of the dream. No more can I doubt that *I* dreamed it. By no possibility can I be made to believe that it is somebody else's dream, that not *I* but somebody else dreamed it. Therefore, I know as positively the reality of the dreaming *I* as I do the reality of the dream I dreamed. So it may be asserted that "I dream, therefore I am," and the proof is and must forever stand irrefragable.

Images in a mirror or shadows on a stream are the closest illustrations to *ideas* of anything I know, and if we can conceive ideas without mind to think them the illustrations will be perfect. Suppose a mirror standing on a wall reflecting images or shadows of changing scenes all day long, this is the best illustration I know of the theory of DR. CARUS. Let us suppose that the shadows *feel*, that they are affected towards persons and things, that there is in them a sense of desire to go out towards things. Let us suppose that after a time these shadows co-operate with each other towards certain objects, group themselves together for certain purposes, that they organize for certain attainments. Then, but not before, we have Mind. The "organization" of the feeling shadows, is Mind. Now note how we reach mind. First we must *assume* that the shadows *feel*, and then that *without* Mind they co-operate, group themselves, and organize; and finally, in process of organization, Mind grows up. And now what is Mind? It is something still made of shadows; being composed of shadows,

it can be no more than a combination of shadows. Yet out of the individual *feeling* and *awareness* of shadows has grown through combination and organization of many shadows, the power to think, and consciousness. A composito Mind can be no more than the elements of which it is composito ; if these elements are only feelings, Mind can be no more than an aggregation of feelings. If the elements, the *feelings* do not themselves, and singly, possess "the power to think," the aggregations of them can not possess it.

Upon reflection it will appear very clear that this exceedingly ingenious system is an effort to create the most profound reality of the universe out of mere *processes*. Processes are made to feel, to think, to be conscious, to will, and to act. Processes are made to usurp the place of Mind and Deity. Processes are substituted for efficient causes. When a properly equipped cause for any phenomena is not readily found, the *process* through which it occurs is personified and made to do duty in its place. This is a very fascinating fallacy with philosophers. It runs all through the systems of both DARWIN and SPENCER.

I have dwelt on this phase of mentality at great length, first because the argument of DR. CARUS is masterly in its ingenuity and plausibility and therefore well calculated to carry a great influence through his wide-spread writings, and next, because the doubts thrown over the Cartesian syllogism by the great authority of IMMANUEL KANT and SIR WILLIAM HAMILTON, and their immense following, have done more, perhaps, to weaken the notions of the reality and personality of the human mind than any other single proposition ever enunciated. True, Dr. CARUS claims that the Cartesian aphorism is the parent of Agnosticism. I cannot concede this. Proof of the entity and personality of the mind cannot be the progenitor of general doubt ; on the contrary nothing can be more natural than for the doubter of his own personal existence to go on to doubt everything. If

evidence of personality is needed at all, and for some, it is, the only irrefragable proof ever offered, or that in the nature of things ever can be offered, is that proposed by DESCARTEs; and, if that could be stricken down and set at naught, the way would be open to all manner of incredulity. But so long as one has a firm hold on his own personality he has a safe starting point for all other investigation.

PROPERTIES OF MIND.

The Idealists say Mind is a subsisting entity, a continuing unity ; that it is an existence as contrasted with phenomena or mere processes. Mostly, they say it is an *essence*. PROF. BASCOM argues that it is a *substance*. But for the present, dealing with it from the stand-point of the Idealists, what are its properties ? It is clear that it occupies Space, but not in so broad a sense as Matter does ; that is, not in a sense that gives it a measurable localization and makes its subject to the laws of Geometry. It is clear that it occupies Time in a much broader sense than does Matter ; in its personality it is extended in Time as Matter is in Space ; it runs parallel with and measures Time within certain definite limits as Matter does Space. It is a discrete, personal unity. Its essential and elemental principle without which it would not be mind, is *Self-activity*, the inevitable alternatives to which are pure Fortuity, or absolute Necessity.

The modes of Mind are Intelligence, Emotion, Purposiveness, Volition, and Directivity or the Control of Forces.

The forms of Intelligence, as we know them, are Seusation, Consciousness, Memory, Attention, Reason or Judgment, and Imagination including Reverie and Dreaming. Intelligence is not a tangible property in the sense that hardness is a tangible property of matter ; on the contrary it is one of inference only in the sense that from certain facts we necessarily infer

a certain substratum for them, and that substratum we have agreed to call Intelligence. For instance, we detect in our own minds a principle which recognizes our own mental modes, as well as objective relations and phenomena; and not only so, but which plans and purposes, that is co-ordinates causes into the production of order, symmetry and regularity. This principle we call Intelligence. To doubt its existence is impossible; and if possible, would be to commit mental suicide, intellectual annihilation, and thus put an end to all discussion. Farther, when we look abroad in nature we see on every side, order, system, and symmetry, which we judge have been educed from like co-ordinated and adjusted causes. Not only so, but we observe causes at work which seem so co-ordinated that we feel justified in predicting orderly results, and generally find our predictions verified. And this principle of co-ordination, of purposiveness in nature, we designate as Intelligence, as we do the same principle found in our own minds.

MIND IN NATURE.

Now the supreme philosophical question of the age is whether or not there is really in nature such a co-ordinating, adjusting, and purposing principle. We have seen that as regards our own minds the negative of the proposition is intellectual imbecility and suicide. Have we not a right, are we not logically compelled when we see the like order and system in nature to accept a like reason for it? Is not that a correct induction? a scientific induction? The Materialist says, no! and he goes to work to invent how blind and unintelligent Matter may have wrought out the semblance of purposiveness, the very appearance and mimicry of Intelligence. He says, no! Nature is utterly sightless, utterly unintelligent, utterly purposeless; nevertheless, she is so wonderfully furnished, armed, and equipped, that she does wonderfully intelligent and purposive work; though blind as Fate she does the work of an omniscient God.

Thus PROF. TYNDALL says: "I stood under an oak; on the ground little oaklets were successfully fighting for life with the surrounding vegetation. The acorns had dropped into the friendly soil, and this was the result of their interaction. What is the acorn? what the earth? and what the sun without whose heat and light the tree would not become a tree however rich the soil, and however healthy the seed? I answer for myself, all matter. And the heat and light which here play so potent a part are acknowledged to be the motions of matter. . . . If the power to build a tree be conceded to pure matter, what an amazing expansion of our notions of the potency of matter is implied in the concession! Think of the acorn, of the earth and of the solar light and heat—was ever such necromancy dreamed of as the production of that massive trunk, those swaying boughs, and whispering leaves, from the interactions of these three factors. Consider the work accomplished in forming the eye alone—with its lens, and its humors, and its miraculous retina behind. Consider the ear with its tympanum, cochlea, and Corti's organ—an instrument of three thousand strings, built adjacent to the brain, and employed by it to sift, separate, and interpret, antecedent to all consciousness, the sonorous tremors of the external world. All this has been accomplished not only without man's contrivance, but without his knowledge, the secret of his own organization having been withheld from him since his birth in the immeasurable past, until the other day. Matter I define as that mysterious thing by which all this is accomplished." (*P. S. M.*, Dec., 1875, p. 148.)

The whole point of MR. DARWIN's great doctrine of Natural Selection is to show how an unintelligent Nature in and of itself has evolved the system of organic life, which in its myriad forms presents such a wonderful counterfeit of purposive results.

LEON DUMONT says: "The peculiarity of selection, in all the cases to which it applies, is to explain order

without calling in the aid of intelligence, and as a necessary resultant of the reciprocal action of forces." (*Pop. Sci. M.*, Jan., 1873, p. 313.)

E. DU BOIS-REYMOND says: "The aim of the theoretical investigator of nature is to understand nature. If this aim is not to be an absurdity, the man of science must presuppose the intelligibility of nature. Final causes in nature are incompatible with nature's intelligibility. Hence, if there is any way of banishing teleology from nature, the man of science is bound to take it. Such a way is found in the theory of natural selection ; and hence we must follow in it. Be it that, in holding this theory, we experience the sensations of a man who as his only hope of rescue from drowning clammers on a plank which can only just keep him above water ; when the choice lies between a plank and drowning, the plank has a decided advantage." (*P. S. M.*, Nov. 13, p. 418).

With a higher aim MR. SPENCER essays to build the whole universe, organic as well as inorganic, with an unintelligent instrumentality, to wit, physical forces giving origin to all action and phenomena by reason of the one supreme quality, Persistence. As I understand MR. DARWIN, he was a theoretical theist, but if his unintelligent Natural Selection had the capacity to produce organic Nature with all the semblance of Intelligent purpose which it presents, what need has his system for a God? And if in the Persistence of Force there be an unintelligent potentiality which undirected was capable of evolving the universe, what need was there and is there for a great Unknown and Unknowable back of it all? If such Unknowable does not reach down into visible Nature with potential virtue and power, what place has He, or *it*, in Nature at all? of what significance or use? If He does so reach down, then Persistence is interfered with, is in so far cut off, it is discredited, it fails, and with it, MR. SPENCER'S system. True, MR. SPENCER says: "Hence the force of which we assert persistence is that absolute Force of which we

are indefinitely conscious as the correlate of the force we know. By the Persistence of Force, we really mean the persistence of some cause which transcends our knowledge and conception." But I am justified in the opinion that MR. SPENCER means that said proposition shall be taken wholly in a metaphysical or transcendental sense, and not in a physical or practical sense at all; otherwise he is involved in most palpable contradiction; for the major part of his great work, "*First Principles*," is devoted to showing how Nature, inorganic, organic, and mental, has been evolved by the action, interaction, and transformation of purely *physical* forces, "the forces which we know," through the principle of Persistence. If then he really and practically means that Persistence is true only of that "absolute Force which is the necessary correlate of the force we know," the great argument in "*First Principles*," fails for the want of applicability; the book is as so much waste paper. But if the Persistence upon which he builds his system, is "the force which we know," as it certainly must be, then my argument remains intact; below there is an unintelligently evolved Nature, *out of reach* of the great Unknowable above. PAPILLON well says: "The source of differentiations cannot be in energy itself, it must be in a principle apart from energy, in a superior will and consciousness."

UNCONSCIOUS INTELLIGENCE.

But before passing from the subject of Mind another question of the very gravest importance arises. Is all Mind, all Intelligence necessarily conscious? or self-conscious? if it is necessary to be more precise. PROF. MIVART, PROF. BASCOM, and others deny *unconscious intelligence* anywhere and everywhere because, as they say, they cannot conceive it. They think they cannot conceive it because they have never been conscious of it. That is they have never been *conscious* of *unconscious* knowledge, therefore such does not exist.

PROF. FISKE says: "In the scientific treatment of the problem there is room for much beside natural selection, but there is no room for *occulta vires*, or pantheistic intelligences, or for tendencies, save such as may be expressed as the unneutralized surplus of forces acting in a particular direction." LEON. DUMONT says: "Hartmann endeavors to prove the existence of a psychical principle maintaining itself above matter, he fancies that he has evolved from these same facts the idea of what he calls 'the unconsciousness,' the idea of an intelligence which has no consciousness of itself, of unconscious manifestations, of unconscious volitions. We declare that we have not succeeded in comprehending this idea; it even seems to us self-contradictory. What is an idea or a volition without the consciousness of that idea or volition? Can the idea be anything else than one form of consciousness, as the volition is another form of it? Hartmann is able to cite facts of intelligence which are outside of the consciousness of the *me*, but without being able to prove that these facts must be unconscious absolutely and in themselves. Who can prove to us that the *I* is the totality of the conscious phenomena of the brain? The *I* is nothing more than a series of facts, and may there not be alongside of this series a multitude of facts which may become real, without being attached to it by any bond of continuity?"
Pop. Sci. M., Jan., 1873.

MR. MIVART says: "Unconscious intelligence is a conception exceedingly difficult to understand, and to many minds appears little less than contradiction in terms; the very first condition of an intelligence being that, if it knows anything, it should at least know its own existence." PROF. BASCOM says: "There can be no knowledge which is not a conscious act of knowledge. * * To be conscious that we know is to know." But let us see to what these negations lead us. In organic Nature there is an almost infinite amount and variety of seemingly intelligent

action. This is only seeming, or else it is real. If only seeming, then it follows that unintelligence produces *seeming* intelligence ; that is just what DARWIN and SPENCER and all the Materialists maintain ; it is the concession of the whole argument. But if real instead of seeming, then it follows that there is an intelligence in plant life, which must be either conscious or unconscious. So it comes to this, that MIVART, BASCOM, and all others must accept one of three propositions : either there is an unconscious intelligence in organic life ; or else plants possess conscious intelligences ; or, thirdly, organic Nature is unintelligently produced. A last possible alternative, which will hardly be insisted upon, because they *do* grow, is that they are directly produced by creative Power. It would seem that when analyzed down to the four possible theories, none but out-and-out Mechanical Materialists could hesitate to accept the first.

Two phases of Intelligence may be noted. One is the recognition of facts or phenomenon ; the other the recognition of plan or purpose ; that is, of *Intelligence itself*. And, as we have seen, there are two modes of recognition ; one is known as consciousness, where we not only know, but know that we know. However, in this mode each mind has to be conscious for itself. I can never be conscious of another mind's thought. I can never know directly that any thoughts pass through your mind. If not directly, how do I get at it indirectly ? By observing that you act systematically and purposively ; and arguing therefrom that you have an Intelligence to plan and purpose. Here I have the two phases of Intelligence, and the two modes of recognition. I have a knowledge of facts given directly by consciousness and a knowledge of purpose given indirectly by observation and reason. When I see you act purposively I reason that you have an Intelligence which purposes. But am I conscious of such Intelligence or such purpose ? Certainly not. Are you conscious of the

phenomena? I can only answer that by reasoning to it again. I argue that because I purpose and am conscious of it, that, therefore, when you purpose, you are conscious of it. This is an analogical but not a necessary conclusion. But we see Nature full of purposive action; we argue that it is all the results of intelligent co-ordination of forces, of intelligent plan, because it is the nature of Intelligence to produce intelligent results, and we do not know, indeed we have every reason to believe, that no intelligent plans can be formulated by other than Intelligence. Then is the intelligent purpose we see manifested everywhere in Nature the result of conscious Intelligence? Other things being equal, reasoning analogically, we should say yes. But does the analogy hold? In plant life we see intelligent purpose everywhere, we are bound to admit the action of Intelligence, or else declare that unintelligence is equally purposive and potent as Intelligence. But here we find no nervous system for the seat of consciousness, as we have in the animal, which indicates a very great unlikeness and probable failure of analogy. And in our own bodies we find a negative answer. Here we find a series of wonderfully systematized and co-ordinated processes which mark, if anything can do so, the presence of purpose and plan. But are we conscious of it? Certainly not unless it should be that we have two consciousnesses, the one of which is entirely unknown to the other, as insisted upon by Dr. PAUL CARUS, and ALFRED BINET.

Then how does the argument stand? By two intellectual processes, Consciousness and Reason, we reach the conception of Intelligence; by the former that of conscious Intelligence, by the latter that of Intelligence in general. DUMONT, MIVART, and BASCOM are unwilling to accept what is not attested by both Consciousness and Reason. They declare that although organic Nature is crowded full of the results of the very highest intelligent co-ordination, and further, that Reason testifies that such results can

only arise out of the purposive action of an intelligent principle, they can not, notwithstanding all, accept the conclusion, because Consciousness is silent on the subject. Because Consciousness is not capacitated to step out of her domain to testify to matters foreign thereto, they discredit Reason which does testify to them. This is certainly, to the largest degree, illogical.

And I want to insist upon the argument that if we are unwilling to accept Intelligence as the necessary author and originator of intelligent co-ordinations we are driven to the alternatives of Chance or Necessity. Either the everywhere apparent plan and purpose in organic Nature is the result of intelligent activity, or else one of the two other possibilities must be admitted ; either it has all simply *happened* to be as it is without cause or reason, or else it is *compelled* so to be by reason of principles necessarily, inherently, and eternally present in the very origin and constitution of the universe ; that is to say, it is either intelligent Purpose or it is Chance without any other possible alternatives.

Whether *Unconscious Intelligence* is the best term for these phenomena is a question of minor importance. Perhaps it should not be called Intelligence at all. But it is of the same order of existence as conscious Intelligence, it is something which purposes and plans, and more than that, which *does* by controlling, co-ordinating, and adjusting forces. It is an immense factor in Nature, which would be an undecipherable enigma without it, and I can not see any good reason for ignoring and denying it, simply because it does not present itself in the garb most familiar to us. Twenty years ago DR. LIONEL S. BEALE published a powerful argument on the same side in a little work, "Mystery of Life," in reply to an attack by DR. GULL on the theory of an intelligent principle in organic life. It never has been answered, and never can be for that matter ; it is absolutely conclusive.

FORCE.

Force is another category eliminated by the Materialists on grounds to be hereafter considered. Force may be said to be an essence, though not a substance, and it has a closer analogy to Mind than to any other of the categories. It has but two properties, first the capacity of acting upon Matter in producing or resisting Motion ; and next, the susceptibility of being controlled by Mind. Its modes are yet largely involved in obscurity both as regards their number and characteristics. The following have been identified and scientifically explained with more or less certainty, to wit: *Gravitation, Cohesion, Elasticity, Capillary, Chemism, some say Vital Force, Heat, Light, Electricity, Magnetism*, and I venture to add *Pressure-Force*. These to a greater or less extent and in manner still very obscurely outlined, co-ordinate, coalesce, combine, metamorphose, resist, obstruct, and dissipate or destroy each other, in accordance with a great branch of science as yet but little known, properly called, the Correlation of Forces. FERNAND PAPILLON says: “The idea of Force is one of those elementary forms of thought from which we cannot escape, because it is the necessary conclusion, the fixed undestroyable residue from the analysis of the world in the alembic of our minds. The soul does not find it out by discursive reasoning, nor prove it to itself by way of theorem or experiment; it knows it, it clings to it by natural and unconquerable affinity.” *Pop. Sci. Month., Sept., 1873, p. 554.* That is to say, Force is one of the uncompounded and unanalyzable forms of being the notion of which is *d priori* in the mind.

MOTION.

Motion is the translation or passage of a body of whatever size or mass from one point in Space to another. Its exact opposite or negation is Rest. An

atom or body not in motion is at rest, one not resting is in motion. Nevertheless scientists do not all by any means make this distinction. Thus JUDGE STALLO says : "In a double sense rest differs from motion, in the language of Euler, 'as one motion differs from another, or, as modern mathematicians and physicists express it, that 'rest is but a special case of motion.' " And again : "Neither mass nor motion are substantially real." This view, which is directly in the face of every sensible definition of Motion which can be framed, grows out of his theory already noticed, that the essence of all existence is *relativity*; and that theory, as we have seen, grows out of the error of substituting the modes or processes for the results of thought; in assuming that the thought instrumentalities which the mind uses in mining down to bottom principles are identical with the principles themselves. JUDGE STALLO himself has well described such false reasoning as substituting the scaffolding of thought for the logical conclusions of thought processes. EULER by the same illegitimate means arrived at the same conclusions : "Motion and rest are distinguished only in name, but are not in *fact* opposed to each other." But if the remaining in one place, and the going from such place to some other place, are not "in fact opposed to each other," what two things in Nature or thought can "in fact be opposed to each other?" If remaining in one place is not *Rest*, what is it? If going from one place to another is not Motion, what is it? And if they are without difference, what two things possess difference?

The Materialists make Motion a category of Existence: but I think erroneously, for as I regard it, it is no more than a form of modality, a co-ordinated mode of Force and Matter in Space and Time. It is the resultant of the action of Force on Matter, through Space and in Time, that is to say, it is analyzable into elements.

Motion, as observed, is the translation of a body from one point to another in Space, and of course, *through* Space ; and it necessarily occupies Time ; it is therefore in Time. The properties of Motion are Velocity or Speed, and Momentum. Its submodes are, first, as regards Speed, Uniform, Accelerated, or Retarded ; next, as regards Direction, Rectilinear, Curvilinear, or a combination of the two ; third, as regards the point of observation, Absolute, or Relative. The antithesis or negation of Motion is Rest. A body not moving is resting.

But JUDGE STALLO denies that there can be any absolute rest : "Absolute fixity in space is impossible under the known conditions of reality. The fixity of a point in space involves the permanence of its distances from at least four other fixed points not in the same plane. But the fixity of these several points again depends on the constancy of their distances from other fixed points, and so on *ad infinitum*." This is an equally vicious error with the assumption that Rest is a special case of Motion and reached by the same process of reasoning. As a matter of fact it may be that by reason of the action of gravitation there are no bodies absolutely at rest, but we have no right to assert positively that such is the case. There may be regions in Space, for aught we know, to which gravitation does not extend, and where bodies may be absolutely at rest. It is not long since the ablest astronomers, mathematicians, and metaphysicians supposed the sun absolutely at rest in the centre of the solar system without finding any incompatibility in the theory ; and, subtracting a few recent discoveries, they would still be in the same doubt. But granting that there are no bodies fixed in space, it does not follow that there are no *fixed points* in space. On the contrary the proposition that there can be no "fixity of a point" in space, if accepted, would dissolve the science of geometry into thin-air : if there are no fixed points there can be no lines and distances

between points, and no directions of one point from others, and consequently neither size nor shape anywhere or to any thing. JUDGE STALLO seems to conclude that a moving body carries with it the point of space which it occupies at any moment, a view that accords with no known physical or metaphysical fact whatever. A moving body is continually passing through or over points of space, leaving them behind it, and going on towards others. If it carried all these points with it, it would crowd them all together, it would cause a contraction in space ; and then what would it leave behind it ? I think, therefore, without a doubt, Space is what it is, irrespective of the occupancy, movements, or quiescence of Matter ; and that Rest and Motion are qualities both disparate and opposite, and equally natural to Matter. If, on the contrary, Rest is impossible and only Motion natural to Matter, then there is no need of Forces to move matter and no official room for a supervising Mind to direct Forces.

As already remarked; Materialists exclude Force from the categories and include Motion ; and with them it is not a question of *Classification* but of *Existence*. They simply annihilate Force and put Motion in its stead. They say there is no place, nor room, nor use, for Force in the economy of Nature, that it is not to be found there, that by the help of Motion, Science can get along very well without it. By such use of Motion they necessarily put it in the categories of Existence. So it becomes evident that the great question in Physics is and must be whether Force is a necessary or mythical agent in the production of Motion, whether Motion can or can not serve the supposed uses of Force in Nature ; Materialists answer that Force is a wholly imaginary factor : that Motion can fully supply the supposed need.

MATHEMATICS.

And what is the argument ? In the first place it is averred that Mathematics can render as complete

an account of Nature without Force as with it; that it does not need Force in generalizing its equations. No doubt this is true; but if it proves any thing, it proves too much, as we have already seen, for the same is true of Matter. All Mathematics needs, to reach any or all, even the highest of its results, are its "counters," its units to begin with; and these may be real or imaginary, actual or assumed, abstract or concrete. Given all the distances and angles, velocities and accelerations, in any real or assumed units of Space, Line, and Motion and we have all the points needed for counters in the universe, and Mathematics can work out its equations equally well though all Force, and all Matter too, should be annihilated. Therefore Mathematics can no more disprove the existence of Force than of Matter. It is very clear, therefore, that when Mathematics attempts to solve the question of the inherent essence of any existence, as it is called upon to do here, simply because it can manage to get along as well with one kind of counter as another, as well with abstract as with concrete units, it is dropping entirely outside the boundaries of its legitimate domain, and the scientists who are urging it forward in such directions have entirely lost their logical bearings. MR. J. S. MILL says: "Mathematics can be applied to objects of experience only in so far as these are measurable; that is, in so far as they come or are supposed to come under the categories of extension and number." PROF. LE CONTE says: "Mathematics deals only with space and time, number and quantity; and is therefore independent of matter and force." PROF. LORD RAYLEIGH says: "The higher mysteries of being, if penetrable at all by human intellect, require other weapons than those of calculation and experiment." DR. W. T. HARRIS says: Mathematics deals directly with the separation of the quantitative elements from the qualitative, and the fixing of their universal value by comparison with a unit." Mathematics can not determine *what* a thing *is*, but only what *direc-*

tion, size, and shape, it is ; if more than one *how many* there are ; if in motion, the *path, velocity, and momentum* of the motion ; and finally, the *quantitative or numerical ratio* between any two or more of these measurable properties of different modes of existence.

MOTION *vs.* FORCE.

But let us follow the argument along. What is the theory ? Why, that the amount of Motion in the universe is constant, that no Motion disappears, that it only changes form, only passes from one body to another. How can that be ? How can it pass from one body to another ? Motion, remember, is the translation of a body from point A say, to point B. How can such translation or passage of one body through one certain piece of space be transferred into another body ? Is it not clear that the proposition is utterly meaningless ? that no sense can be made of it ? Then what ? Why, that to put any sense into it we must assume that when the body reaches point B, some other body, say D, commences at that point to move and goes on through space, say to point E. Clearly the two motions are not the same, for the moving bodies are different, the routes are different, and the times are different ; that is, all the elements that go to make Motion in the one case differ from the elements of Motion in the other. Yet they are related, no doubt of that. In what way ? By sequence in both time and space, the latter commenced just when and just where the other ceased. Why so ? Did some efficacy or power pass from body C at B to body D compelling it to move ? If so, such efficacy was nothing *else* than *Force*, and *that* the Materialists will have none of. Then what ? If no efficacy or potentiality passed from one to the other then the Motion of body C did not compel that of body D. And then ? If neither any Motion, nor any virtue, or potentiality, passed from C to D, it must be that the Motion of D

was compelled by some outside necessity, under some rule or law which made the Motion of C the *occasion*, but not the *cause*, of the Motion of D. Two consequences follow as the result of this reasoning. In the first place Motion fails to fill the place and office of *eliminated* Force. The substitution attempted by Materialists can not be made. Motion does not answer the purpose. It can not explain the phenomena. In the next place the theory eliminates all *Cause* as well as Force from Nature, and throws us back upon bald, stern, absolute Necessity. FERNAND PAPILLON says : “ Motion may serve to measure Force, but not to explain it. It is as subordinate to the latter as speech is to thought. In truth, motion is nothing else than the series of successive positions of a body in different points of space. Force, on the other hand, is the tendency, the tension which determines the body to pass from one to the other of these points ; that is to say, the power by which this body considered at any instant in its course, differs from the identical body at rest. Evidently this something which is in one of these two bodies and is not in the other is a reality, distinct from the trajectory itself.” (*Pop. Sci. Month.*, Sept. 1873, p. 554). And PROF. FISKE well says : “ Motion is not a force but one of the manifestations of force.”

But following on, we find that often, contrary to the theory, Motions *do* cease without being taken up by any other bodies. How do the Mathematicians keep the balance of their equations in such cases ? By invention ; by calling on most lively imaginations. They say true, Motion *seems* to cease in such cases, but in reality it does not so ; it only ceases its activity, becomes quiet, *rests*, is still. So much activity on one side equals so much inactivity, so much rest on the other side ; so much plus equals so much minus ; so much affirmation equals so much negation. Could anything be more palpably contradictory ? Oh ! but they have a *term* for it ; they do not let it rest in this bald nakedness. They call the negation, the minus term,

Potential Energy. And what does that mean, pray? Sleeping power they tell us. A stone is hurled aloft and rests on a roof—they tell us the identical same Energy, (meaning Motion), which carried it up, is sleeping in it ready to spring to life on occasion and bring it to earth again. But what is the fact? Only this, the stone is in convenient position, when its support shall be removed, for Gravity to act upon it and bring it down; just this, and nothing more. The watch-spring is wound up by the hand. The scientists say the energy, (Motion), of the hand is transferred to the spring and slowly unwinds it. The fact is the hand puts the spring in such position that the molecular elastic force in it compels it to unwind itself. So in every aspect the materialistic excision of Force is unsatisfactory and inadequate. It is simply appealing to Necessity under the masque of Motion. They dispense with the Force of Gravitation as of all other forms of Force. They say the Motions of the astronomic bodies are simply the results of their relative positions, that Earth moves about the Sun with her accustomed velocity not by reason of the action of any Force but because of the fact of her particular distance from him. This too is a dispensation of all Causality and an invocation of Necessity.

CAUSALITY.

What is Cause? It is the notion we have of a compelling power for all change; all becoming, all phenomena of whatever kind. When we think of a present occurrence we *are forced by the very constitution of our intellectuality* to think a something in it or back of it which *makes* it occur. When we think of a past change we as necessarily think a something along with it which compelled the change. If we think of a future becoming, we in like manner think of a potentiality making it to become. Causality then has reference, not to the *essence* of things, but to the *changes* of things. If we can persuade

ourselves that any object has remained in its present condition through all eternity we need no *causal* explanation for it. JUDGE STALLO very well says: "The question of *cause* never arises except where there is change." However, the physicists have agreed that there is *no Cause*, that the word with its meaning may be banished from the language. They think they have no need for either, yet they are of course under the necessity of taking a substitute for it. None of them are able to *entirely* rid themselves of the necessity of using the term; certainly none of them are able to rid themselves of any portion of the idea of Causality itself, for that would be intellectual evisceration; since, as we have seen, the idea of Causality is a necessary concomitant of all notions of change. So they endeavor to explain it away by crowding some other notion into its place. They say Causality is simply a chain of events, a succession of occurrences. JOHN STUART MILL says: "I have no objection to define a cause, the assemblage of phenomena, which occurring, some other phenomenon invariably commences or has its origin." CHAUNCEY WRIGHT says: "The word Cause simply signifies the phenomena, or the state of facts, which precede the event to be explained, which make it exist, in the only sense in which it can clearly be supposed to be made to exist; namely, by affording the conditions of the rule of its occurrence." (*Phil. Essays*, p. 17.) Also: "I agree with Mansel, Comte, and James Mill, who see nothing in causation but invariable antecedence." Again: "Cause and effect is the result of the indissoluble association of the ideas of antecedence and sequence in fixed and constant order. " What experience makes known, is the fact of an invariable sequence between every event and some special combination of antecedent conditions, in such sort that wherever and whenever that union of antecedents exists, the event does not fail to occur. It is not by disclosing any *nexus* between the cause and the effect, any sufficient reason in the cause itself why

the effect should follow." (*Ibid*, 279.) "The relation of cause and effect means an unconditional invariable succession."

PROF. FISKE says: "What is the belief in the necessity and universality of Causation? It is the belief that every event must be determined by some preceding event and must itself determine some succeeding event." (*Cosmic Philosophy*, Vol. I, p. 147.) And again: "All that the hypothesis of Gravitation really asserts is that matter, in the presence of other matter, will alter its space relations in a specified way and there is no reference whatever to any metaphysical *occulta vis* which passes from matter in one place to matter in another." (*Ibid*, Vol. II, p. 273.) And again: "Physics knows nothing of Causation except that it is the invariable and unconditional sequence of one event upon another: whether the one event, in a metaphysical sense, *constrains* the other to follow it or not we cannot tell. Physics knows nothing of such constraint, neither that it exists, nor that it does not exist." (*Ibid*, p. 127). And once more: "Causation may therefor be defined as the unconditional invariable sequence of one event, or concurrence of events, upon another; and this is all that is given in the phenomenon. But metaphysics is not content with this conception of cause. It prefers to regard causation as a kind of constraint by which the antecedent event obliges the consequent event to follow it."

"Viewed under its subjective aspect, our knowledge of causation amounts simply to this,—that an experience of certain invariable sequences among phenomena has wrought in us a set of corresponding indissolubly coherent sequences among our states of consciousness; so that whenever the state of consciousness answering to the cause arises, the state of consciousness answering to the effect invariably follows."

" . . . The proposition that the cause constrains the effect to follow is an unthinkable proposition;

since it requires us to conceive the action of matter upon matter, which we can in nowise do." (*Ibid.*, p. 154.)

PROF. BAIN says: "Material phenomena are in a state of change or mutation; they show successive phases; and in their *succession* we recognize the peculiar and remarkable bond termed Causation, or Cause and Effect. A spark falls into water, it is extinguished; it falls on gunpowder, there is an explosion." PROF. HUXLEY says: "The fundamental axiom of scientific thought is that there is not, never has been, and never will be any disorder in Nature. The admission of the occurrence of any event which was not the logical consequence of the immediately antecedent events, according to these definite ascertained, or unascertained, rules which we call the 'Laws of Nature,' would be an act of self-destruction on the part of Science." PROF. HAVILAND says: "Cause is simply the preceding conditions of any phenomenon, and in the absence of which so far as we know it cannot occur."

It is very evident that if this theory of Causality, or rather of *no* Causality, this theory that all there is of Causality is the necessary concatenation of events, of the following of one occurrence by another, obtains, we dispense with a directive, creative Mind in Nature, because we dispense with its need and its use. The logical outcome of the doctrine is bald atheism, whatever may be the theoretical theistic or theological views of its advocates. It is a doctrine lying right up against the dividing edge between the notions of a mechanical necessarian system of Nature, and of a purposive creative system. MILL founds this theory on his psychology of sensationalism. Says he: "Cause and effect is the result of the indissoluble association of the ideas of antecedence and sequence in fixed and constant order." I shall not stop here to discuss his psychology, but will only notice the illogical assumption, that because we derive the notion of Cause from experience through

the faculty of association, therefore, Cause itself is only an association of events. I am not certain that MR. MILL himself went to this length, but his followers do. This is the logical error heretofore noticed of substituting the *processes* of thought for the *thought-facts* themselves. It is always a vicious system of reasoning, often leading to broad error, as in this instance, and never by any possibility lending certitude to its conclusions. PROF. FISKE, declaiming against metaphysics, contends that the deliverances of consciousness in favor of a Cause for every change are not entitled to credence, because they are metaphysical conclusions. But the fact is that it is only by a resort to metaphysical considerations that the testimony of consciousness can be in anywise discredited. The argument against the verity of consciousness is itself wholly metaphysical.

Of course there can be no contention with the Scientists who eliminate the *word*, *Cause*, from their vocabulary and try to eliminate the *idea* from the realm of thought. As Causality includes both Force and Mind, they elect to put themselves outside the pale of reason by deliberately extinguishing all mentality. MR. MILL's theory is scarcely better, for it does not touch the true notion of Cause. In a simple historical succession there is nothing to analyze, nothing to explain. This follows that, and this that, throughout eternity, because it does, and no "Why?" admits of inquiry or answer. It is absolute Necessity because it is as it is, without explanation, interrogation, or reason. We behold with wonder the changing phenomena of all Nature, and when we ask How? and Why? and Wherefore? we are answered that it is so because this consequent follows that antecedent; and when again we repeat the Why? we are told it does so because it does so. And this, at which Reason stands aghast, is offered in the name of Logic and Philosophy, and accepted by "half the gaping world." Yet none can have greater admiration than I for the logical acumen of JOHN STUART MILL.

But scarce has any human mind, however great its powers, ever yet been able to outgrow or arise from the Procrustean bed of system when once it has allowed itself to be tied down upon it.

HAMILTON's doctrine is hardly better. He in the first place has first causes, or a First Cause, Deity, and second causes; which would all be well enough, if he gave a correct notion of Cause itself. He says: "Of the causation of Deity we can form no possible conception." Here SPENCER coincides with him. I will not now stop to discuss this error. But to his "Second Causes." What have we now? Simply a continuity of existence growing out of the *inability* we find of either creating or annihilating any existence in thought. MILL powerfully combats the whole notion of this *inability*. I shall not take part in this war of giants where either conclusion has led to error. HAMILTON says: "We are compelled to believe that the object whose phenomenal rise into existence we have witnessed did really exist, prior to this rise, under other forms. But to say that a thing previously existed under different forms is only in other words to say that a thing had causes." And again: "When we are aware of something which begins to be, we are, by necessity of our intelligence, constrained to believe that it has a Cause. But what does the expression, *that it has a cause*, signify? If we analyze our thought, we shall find that it simply means, that as we cannot conceive any new existence to commence, therefore, all that is now seen to arise under a new appearance had previously an existence under a prior form. We are utterly unable to realize in thought the possibility of the complement of existence being increased or diminished. We are unable, on the one hand, to conceive nothing becoming something—or, on the other, something becoming nothing." (*Metaphysics*, Lect. 30.)

Here the old error turns up of substituting *thought-processes* for *thought-facts*. And the theory is certainly deficient in the outset in not assigning a reason

for the change. To say a thing is the same before as after a change may express a fact, but it explains nothing, it gives no reason, it shows no Why? it presents no *Cause*. But this is not all of HAMILTON's theory. He proceeds: "Of second causes, I say, there must almost always be at least a concurrence of two to constitute an effect. Take the example of a vapor. Here to say that heat is the cause of evaporation is very inaccurate—at least, a very inadequate expression. Water is as much the cause of evaporation as heat. But heat and water together are the causes of the phenomenon. Nay, there is a third concourse which we have forgot—the atmosphere. Now, a cloud is the result of these three concurrent causes or constituents; and, knowing this, we find no difficulty in carrying back the complement of existence which it contains prior to its appearance." Again: "We think causes to contain all that is contained in the effect; the effect to contain nothing which was not contained in the causes. A neutral salt is an effect of the conjunction of an acid and alkali. Gunpowder is the effect of a mixture of sulphur, charcoal and nitre, and these three substances are again the effect,—result, of simpler constituents, and these constituents again of simpler elements, either known or conceived to exist." And again: "An effect is nothing more than the sum or complement of all the partial causes the concurrence of which constitutes its existence. Causes always continue actually to exist in their effects." And DR. McCOSH says: "All natural causation is produced by two or more bodies acting on each other, the effect being that both are changed. A ball in motion strikes a ball at rest; this constitutes a cause. The effect is that the ball in motion is stayed and the ball at rest moves." Again: "Causes always consist of two or more agents called concourses; effects consist of the same agents changed." Once more: "There is nothing in the effect which is not potentially in the cause; that is, in the agents which constitute the

cause." (*Religious Aspect of Evolution*, p. 2.)

Now these eminent thinkers have missed the correct answer because, in two particulars, they have missed the scope of the inquiry. They have assumed, in the first instance, that what is wanted is a Cause for *things*, for existences; whereas, it is a Cause for *change*, for a *becoming*, that the inquiring mind demands. In the next place they confuse prior *material forms* and *occasions* with Cause, which is a very different notion to either of them. An alkali and acid are prior material forms of a salt, but not the Cause. So water is a prior form of a cloud, and the atmosphere is the means or occasion of its formation, but neither of them are in any true sense the Cause of it. The Causes of the neutral salt are certain *chemical forces* resident within the acid and alkali; the bringing of these two substances together gives *occasion* for the action of these forces, and the result or effect is the formation of the salt. To say that the acid and alkali are the *Cause*, or that the manual act of mixing them together is the *Cause* of the salt, is to altogether drop out the *true Cause*, that which *makes* them to *cease being acid and alkali* and to coalesce into a single new substance. So sulphur, charcoal, and nitre are not *Causes* of gunpowder at all, but *only* constituents. Gunpowder being not a chemical compound but only a mixture, its *Causes* are the manual forces which prepared and brought the constituents together. It is such preparation and mixing that *made* them *cease* to be sulphur, charcoal, and nitre, and *come* to be gunpowder.

SIR WILLIAM HAMILTON's Cause, he tells us, is continuous existence through all changing forms. A thing is to-day, we cannot annihilate it in thought, we cannot think back to the time when it was non-existent, we must think it in some form or other whenever we follow it in thought. But why? Because of our *inability* to think it otherwise. What does this amount to? To a negative quantity, it seems to me; to a simple positing of our own mental

incapacity ; to the admission that if our own mental capabilities were greater there might be no *idea* of Cause at all, no *Cause* at all. But granting in this instance that there may be a positive germ wrapped in this negative form of thought, still when we demand Why? what do we get? When we demand why the panorama of Nature unrolls before our eyes as we behold it do, what answer comes back to us? It does so because it cannot cease to exist, because it always has existed and always must exist, in some form or other. When it was not what we see it, it was something else ; when it was not organized it was unorganized matter ; when it was not matter it was force ; when it was not force it was some mode or potentiality of Deity. Now there is a great deal of theory and a great deal of assertion about all this, but wherein does it answer the Why? and How? and Wherefore? of the inquiring human intellect? How does it help any whit out of the rut of Necessity? What is it but the old refrain : "It is because it is?" Like the other theories discussed, it is an empty husk lacking the kernel, the notion of Cause, in which is wrapped the explanation of all phenomena. It lacks the central and necessary thought—*something* does it, *something* makes it, *something* compels it to *do*, to *become*, and to *be*. It does not fill the requirements of either a sound Science, a sound Philosophy, or a sound Theology.

The Theory that Causality is to be found in the material components of a substance, or in the material instruments by the means of which it has been made to assume its present form, is even more untenable. Without admitting the notion of a *something* compelling it to be, it nevertheless raises material forms into the potentiality of forces. It makes matter act, while ignoring force and without assigning reasons. The acid and the alkali make the salt, are the *causes* of it. Why? The anvil, and the tongs, and the hammer, and the iron, are causes of the horse-shoe. Why? Because they act in that way. And why do

they act in that way? Because they do. There can be no further answer. Matter *acts* because it does, and that is all there is of it.

CHAUNCEY WRIGHT, though insisting upon the theory that Causation is naught but a consecution of events, gives an illustration of his view that might very well be construed into a support of the Hamiltonian philosophy; or equally well to the establishment of a slightly different theory which might be called the *Instrumental* theory of Causality; since it finds the principle of Causation in the instruments by the use of which transformations are produced. He says: "The blacksmith's forge and anvil, and his arm and sight, are concourses or conditions of the effects produced by his hammer." Here the only true Cause mentioned, and that but obscurely, is the muscular energy of the smith's arm. The forge, and anvil, and hammer, and eye are only *instruments* used in applying the Cause; that is, the *cause*, the *power compelling* change in the hammered bar of iron, comes through or by means of these instruments.

This latter theory underlies MR. DARWIN'S doctrine of Pangenesis and PROF. WEISMANN'S doctrine of germ-cells, if not also PROF. HAECKEL'S doctrine of Perigenesis. The two former certainly, and the latter probably, find a principle of activity in material molecules; with them molecules and cells are the *causes* of organism. So BUCHNER builds his system of Atheism on the same theory. He says: "Not only physical but psychical energies inhere in matter." (*Force and Matter*, p. 66). Again: Motion is a necessary and indispensable attribute of matter." (*Ibid.* 73). And again: "Motion must be regarded as an eternal and inseparable property or as a necessary condition of matter." (*Ibid.* 75). To the same effect is GERHARDT, who remarks; "Matter possesses one inherent quality; it is continual activity." And HOLBACH says: "The world is nothing but matter and motion." With these philosophers matter is the active principle, the agent, the *something* that *does*.

Quotations already made from PROF. TYNDALL illustrating his views by the growth of the eye and the oak tree are posited on the same supposed principle.

Now in each of these theories the essential germ and integral principle in the true notion of Cause, is dropped out or ignored ; no notice is taken of it. Instead of a *compelling power* to all change which we do necessarily always think, which we cannot help thinking without intellectual imbecility, we are furnished with notions which we do not *have* to think, which we can think or let alone as we choose, or as it may happen ; only consecution of events, priority of existence, or self-used instrumentalities. PROF. SHOUP says very aptly, "what one thinks and cannot by any possibility not think, one knows."

But these several views of Cause are only theoretical, none of them are practically accepted by scientists. Indeed, Science is the search after and elucidation of that which *compels* phenomena, of that which *makes* changes, makes events succeed each other. That knowledge which might concern itself with only the historical succession of phenomena would be no more than the husks of Science with the kernels all shelled out. It would be no explanation of anything. It is true that CHAUNCEY WRIGHT says : "Metaphysics demands, in the interest of *mystery*, *why* an elementary antecedent is followed by its elementary consequent. But this question does not arise from that inquisitiveness which inspires scientific research." That is to say, Causality is a subject well enough for metaphysical discussion, but Science has no use for it, nothing to do with it. Yet every science at every step illustrates and enforces the negation to the proposition. What is the great demand of the age in the doctrine of Evolution ? To find an adequate and satisfactory *Cause* for organic variation ! The chronological order of variation is not sufficient. Every Evolutionist feels that until a Cause capable of meeting the requirements of each varying phase of the phenomena is reached, Evolution

is standing on an insecure basis. Take the science of Medicine. What is the great *desideratum* there? To find, not the chronology of the symptoms, but the Causes of diseases. In Biology what is it? To find what *causes* the phenomena of life and sensation. In Geology? What *caused* the changed conditions of formations everywhere present. And so on through the circle of the Sciences. Cause is the demand everywhere! And it seems very strange, indeed, that such an analytic mind as that of CHAUNCEY WRIGHT, admitting its reality at all, could have been satisfied to relegate the notion of Cause from Science and assign it wholly to Metaphysics. It must have been that he was so steeped in mathematico-physical abstrusities that he was incapacitated to take a horizontal look all around at all sides of existence.

And so, too, practical life is everywhere, at all times, and in all things, regulated upon the theory that Nature is full of Causes which compel things to be, events to occur, changes to happen. Practically sane people never eliminate Cause, never accept Motion as a substitute for it, never see in it only a chronology of events. From earliest infancy all along the journey of life the continually recurring questions are: What made it to be as it is? What compels the changes now occurring? Bar out these inquiries and you not only strike Science and Philosophy dumb but set a period to all human progress. Is it not strange that this, the simplest, the clearest, the easiest, the broadest, the fullest, the nearest-home idea of Cause that can possibly be framed, should have been so overlooked by great philosophers? But it is not overlooked by all. Says PROF. BASCOM: "The mind puts back of every phenomenon, every event that transpires, something, some force, which causes it to appear and transpire. Fragments of rock are flying in the air from the explosion of a blast. The immediate cause of this momentary effect is the propelling force conceived of as lodged in each of the pieces and ready to be delivered by it to any ob-

ject which it may hit." (*Science, Philosophy and Religion*, p. 64.) M. VICTOR COUSIN says: "Every civil action is founded on the hypothesis, universally admitted, that man is a cause; as the science of nature is founded on the hypothesis that exterior bodies are causes, that is, have properties that can produce and do produce effects. Not only is there in the human mind the idea of cause; not only do we believe ourselves to be the cause of our acts, and believe that certain bodies are the cause of the movements of certain others; but we judge in a general manner that no phenomenon can begin to exist either in space or in time without having its cause. Here is something more than an idea, here a principle exists; and the principle is as incontestable as the idea. Imagine a movement, any change whatever: as soon as you conceive this change, this movement, you cannot avoid supposing that this change, that this movement is made by virtue of some cause." (*History of Modern Philosophy*, Vol. II. p. 249.) LOCKE says: "Whatever change is observed, the mind must collect a power somewhere able to make that change." (*Essays*, p. 151.) MR. J. D. MORELL says: "All causation implies power or force; that power wherever exerted, or through whatever medium, is an immaterial thing." (*History of Modern Philosophy*, p. 698.) DR. W. T. HARRIS says: "A real cause is an originator of changes or new forms of existence. It is not something that demands another cause behind it, for it is self-active. The chain of relativity ends in a true cause and cannot be conceived without it."

This theory predicates Mind and Force as the compelling Causes or reasons for all change and all phenomena past, present, or future. And this order of existence must find the reason of its being and action within itself; it must contain the principle of inherent self-activity; somewhere along the line must be found the point of uncaused Cause, of spontaneity of which no analysis can be given and no explanation

be made. MR. SPENCER has well remarked that there must in the nature of things be a limit to analysis. Says he: "Of necessity, therefore, explanation must eventually bring us down to the inexplicable. The deepest truth at which we can get at must be unaccountable. Comprehension must become something other than comprehension, before the ultimate fact can be comprehended." (*First Principles*, p. 73.) That is to say, every argument must start with some assumption; if we would reason at all we must start with some unresolved bottom principle to build upon. An uncaused Cause, a free and inherent self-activity is such a bottom premise. It is not susceptible of explanation or illustration, of analysis or demonstration. But what are the necessary attributes of such an uncaused Cause? What does self-activity involve? It means of course free volition, and it *involves intelligence*, the knowing what to do and how; for otherwise, it would not be free but bound up in some accidental chain of fatality. And along with intelligence it involves purpose, not only the knowing how to do, but the determination to do.

This theory of Causation, which in distinction to all the others may be called the Idealistic theory, involves as its very essence a free, self-active, intelligent Architect and Ruler of the Universe. None of the other theories do. The Scientific theory which eliminates Cause altogether is essentially Atheistic; it leaves no room or place for God. The theory of BUCHNER and others, which finds all Cause in material atoms, molecules, cells, combinations or instruments, is, in reality, no better. DARWIN's gemmule, HÆCKEL'S plastidule, WEISMANN's germ-cell, SPENCER's physiologic unit, WRIGHT's hammer or anvil, HAMILTON's acid or alkali, McCOSH's colliding balls, each displaces Deity and usurps His dominion to the extent of ground assigned it. Each puts Him out of His own universe so far as it supplants His activity with a material instrument; for to just that extent each

furnishes its own materialistic means of running the phenomena of Nature. And not a great deal better are the theories of HAMILTON and MILL, for although they do not deny God in Nature, they do ignore Him. While both these great philosophers were earnest theists, it is true, nevertheless, that the idea of God is not to be found in either of their doctrines of Causality. They make Him to stand outside of and above Causality, neither appearing in it nor behind it, nor being demonstrated by it.

The theory of COUSIN, MORELL, HARRIS and BASCOM, I believe to be the true doctrine of Causality, since it is the only doctrine that coincides with either the laws of thought or the practical understanding and conduct of mankind generally. The DUKE OF ARGYLL accepts this view partially. He says:

"It is impossible to conceive anything happening without a cause. . . . All attempts to reduce this idea of Causation to lower terms have been worse than futile. They have uniformly left out something which is of the very essence of the idea. The notion of uniform antecedence is not equivalent." However, he has become bewildered in attempting to grope through the shadows of Conservation, and speaks of cause becoming an effect, and an effect, a cause. "Thus Heat is very often the cause of visible Motion, and visible Motion is again the cause of Heat." This is very close to the notion of Causality expounded by McCOSH, founded on one of HAMILTON'S explanations. He gets closer to the true idea where he says: "Our idea of Causality always does, and always must, go behind and beyond the Visible, and so we can readily understand how it is that Physical Forces must of necessity seem to us to be working 'by themselves,' when in reality they may be working under a strict control." (*Unity of Nature*, p. 115.)

Causes are of two orders : Force and Mind. Force acts directly on matter in the production of Motion. Mind acts directly on Mind through the medium of ideas, that is, information conveyed, or by uncon-

scious suggestion ; it acts directly upon Force by controlling it, and indirectly upon Matter through the agency of Force.

The Effects of Forces are of three kinds : First, the production of Motions in Matter ; second, the modification of other forces by acting more or less in opposition to or in harmony with them ; third, indirect action on Mind through material instruments. The Effects of Mind as a Cause acting indirectly are all mentioned above as effects from the action of Forces ; acting directly, they are, first, the controlling and grouping of Forces, and secondly, direct influence on other Minds through language or suggestion.

But this analysis is in harmony with none of these systems of Causality but the one here advocated, because none of the others make true Causes of either Force or Mind, much less of both.

THE INFINITE.

There are two possible conceptions of the Infinite : one positive and complete, the other negative and incomplete, or rather, *pseudo* and supposititious. The first conception is that of the excess of being beyond any thought-limitations we can put upon it; the other is that of the full, endless cycle of existence, the totality of the endless. The first conception the mind can very well grasp, the second it never does, never can grasp ; indeed, it cannot conceive a development of intellectuality that would enable it to grasp the notion ; that is to say, the mind can neither conceive the endless totality of any existence nor conceive of any thought-faculty which would empower it to do so. Much of the confusion in discussing the Infinite has arisen from the fact that philosophers have not kept this distinction in mind. In thinking Space, for illustration, no matter what limit we may think to it, the notion of Space will inevitably rise up beyond. Go to the farthest boundary that the telescope and spectroscope have given us for the

universe, and we can place no limit there ; for Space rises up, on and on, beyond, so often as we may attempt to extend the boundaries of thought. So we cannot think Space as being absolutely limited. And no more can we comprehend or grasp all of it in thought ; yet we know that it must be either the one or the other, either absolutely bounded in somewhere, or else absolutely without limits or boundary. This is HAMILTON's Law of the Conditioned ; and it is the strongest point in his system of philosophy, as MILL's criticism upon it is the weakest point in his masterly *Essay on that system*.

And this gives the closest idea of the *Infinite* that we have capacities to grasp. We do not and cannot think all of Space, *infinite* Space ; all we can do is to set the widest boundary we please, and then see it rise beyond in spite of all. Go to the utmost outskirts of the known physical universe and then go in imagination a million million times as far to plant your limits, and still Space rises beyond. All, then, that the idea of the *Infinite* in Space means to us, is simply our inability to set thought-limitations upon it, simply the consciousness that in thought we cannot subtend all of Space, cannot reach any absolute limitation for it. Says MILL : "The conception of the Infinite is that of being greater than any given quantity, a conception that we all possess." Therefore the notion entertained by COTTSIN, HAMILTON, and SPENCER, that the *Infinite* in its totality is an idea which may be tangibly grasped, realized, and entertained by the mind, is wholly erroneous. We simply get the definite and tangible idea of *so much Space, so and so limited*, with the notion of an *indefinite extension* beyond. The same is true if we try to set limits on the minimum of Space. However small we may take our smallest volume of Space, the notion of a somewhat smaller still lies beyond.

The same conditions attend the notion of Time. Go back as far as we please to find a beginning for Time, and we find it still stretching backward ; or go

forward until the wings of imagination droop, and still we fail to find a final period to Time; and still we see it rising, on and on ahead of us. We cannot reach a final limit in either direction, much less obtain a notion or concept of the whole of Time. The idea of the Infinite as applied to Time, then, is the greatest term of definite duration we care to grasp, with duration reaching still on indefinitely beyond such limitation. Says MILL: "We cannot have an adequate conception of space or duration as infinite."

And so with abstract Numbers. Fill the universe with figures representing a highest number, and yet beyond all this we know other figures could be added representing still higher numbers and to such process we can set no thought limits. But when we turn to body, to Matter, how is it? We think the material universe as large as we please; we go to the utmost boundaries of the telescope, and set our boundaries there, and what have we? A definite thought of a quantity of Matter with no extension *necessarily* rising beyond. We find no necessity compelling us to think suns, and worlds, and nebulæ, outside the limits. True, reason or imagination *may* extend the boundaries many times the limits set; but there is no thought-necessity, no mental law compelling us to do so, as there is in the notions of Space, and Time, and abstract Numbers. Hence, practically, we get no idea of the Infinite at all as applied to Matter. Theoretically, if we please, we may imagine that the universe extends on and on without limitation, but there is no compulsion upon us to so think; and, when we attempt it, we find the mind is just as impotent to think limitless Matter as to think all of Space. We know we do not and cannot think all of Space, or Time; but, for aught we know, we do think the whole of matter, that is, think it to its utmost limits. Certainly BUCHNER is in error when he declares: "We must pronounce Matter to be infinite in both directions, in the great as in the small;" and again: "As Matter is endless in time

or eternal, so it is no less without beginning or end in space." For, practically, we do not and cannot so think it whatever theoretical opinions we may entertain. Imagination, that is, a pseudo-conception, may go along with BUCHNER, practical thought cannot.

As with Matter, so with Cause. Cause being that which compels change and produces phenomena and action, and change being observable throughout the whole known universe, our notion of Cause must be equally extended; but we find no compulsion to think a Cause beyond the phenomena. The notion of Cause does not rise up of necessity the other side of Nature. Therefore we can have no definite conception of an Infinite Cause. We do not, and cannot, ever think an Infinite Cause, one beyond all limits.

DEITY.

The analysis of Causality leads up to the conception of Deity. As the earliest prattle of the child, almost, is to demand a *cause*, "What makes it, Mamma?" so in the infancy of the human race "with the untutored mind," such inquiries must have been continuous. Every passing phenomenon aroused the necessary suggestion that *something* did it, *something* made it to be. But usually that *something* was hidden, was unknown; and generally there were no seen or thought connections between the compelling *somethings* back of various occurring phenomena. Hence to them the world was full of unknown and disconnected *somethings* compelling things to be, full of Causes; and because they *were* Causes, and because they *were* unknown, these *somethings* were Gods to them. But Philosophy and Science have demonstrated that there were and are order, and system, and connection, between various phenomena; that a single *something* compelled groups of phenomena, and then larger and still larger groups, until all Nature was encircled and taken in under one all-compelling Something, one Cause; and then all gods became one God. And this, I think, is a much more

satisfactory notion of the origin and development of the idea of Deity than MR. SPENCER's hypothesis that it has been evolved out of assumed ancestral ghost stories.

What, then, is the idea of Deity? Simply the notion of Something *doing*; Something compelling things to become, extended to cover all phenomena, to reach all the out-boundaries of the universe. And that is a notion native and necessary in the human mind, as has already been shown. No man can behold or think the phenomena of Nature, the becoming of all forms in the Universe, without thinking a Cause for it all, a Something back of it all compelling it all to be and to become. And that Something is a God, under whatever term designated. One may, like BUCHNER, call himself an Atheist; he may say that the compelling Something is Nature, or Law, or Necessity; it matters not, it is still God under whatever name. Therefore, the professed Atheist is self-deceived, for Atheism is an impossible belief. God vindicates His own existence by ineradicably imprinting His own superscription in every sane human mind, so that only utter imbecility or dissolution can erase it; and, to make the fact as plain as the noon tide sun, it is only necessary to obtain to a correct notion of the principle of Causality. SCHNEIDER says: "Belief in God, at the present time, is almost confined to those who know scarcely anything about natural processes." It may be replied to him that the *disbelief* "in God at the present time is," not only almost, but quite, "confined to those who know scarcely anything about mental processes," the processes of their own minds. *The fool hath said in his heart, There is no God.* Only the fool could have said this, the fool in that he was unacquainted with the laws and processes of his own mentality, the action of his own intellectual faculties; a fool in that he professed a belief in a proposition that was directly, absolutely, and irrefragably contradicted by every thought-process of his own soul,

But the notion of system and order presupposes plan, and purpose, and will, and intelligence. When, therefore, Science and Philosophy have demonstrated a unity of system, and order throughout the accessible Universe, they have demonstrated a purposive, intelligent, volitional Cause for it.

The notion of Deity, then, is that of a purposive Cause, a Cause which co-ordinates, and adjusts all the forces of the universe on plan, and system, and for a purpose. Therefore, the notion of God is coextensive with that of the universe. Make the universe as extensive as we may, our notion of Deity must be equally large, but we do not definitely and tangibly make it larger. We are told that the outward boundaries of the known universe, the farthest nebulae, are 100,000,000 years distant in terms of the velocity of light, that it contains millions upon millions of suns, and worlds unnumbered. Certainly, our notion of Deity covers all the activity, and all the phenomena in this vast space. Does it cover more? Not necessarily. Not practically. We may imagine, if we choose, that the universe extends many million times farther than its known limits; I think a very fair and reasonable argument may be urged that it does so extend, and thus, in imagination, we carry the idea of Deity to that new and utmost limit, but not beyond.

Indeed, I can see nothing incongruous in the notion, that, so far outside of this universe that no ray of light and no throb of gravitation ever passes between, there may be other universes, under other frames of natural law, and governed by other Deities. I do not say that I know any fact or argument looking in that direction, but only that it is not unthinkable and not contradictory to either the laws of thought or the facts of nature as we know them.

It follows that the notion of Deity is as definite and certain as that of Nature itself, since it is but the notion of that cause which compels all change, all co-ordination, all phenomena. True, the whole of Deity cannot be grasped in thought, but neither can

the whole of nature. A naturalist may know a bird or a plant very well, but no naturalist knows all birds or all plants. A physiologist may have a good understanding of the action of a particular muscle or nerve, but no physiologist understands the actions of all muscles or nerves.

M. COUSIN, SIR WILLIAM HAMILTON, and HERBERT SPENCER, agree that the human intellect is competent to the attainment of the idea of the Infinite ; in this they are all in error. M. COUSIN insists that such idea is positive, full, and adequate. In this he is doubly wrong. HAMILTON makes it a negative impression, or at least, a notion that we can not positively and practically apply to any real existence. With him we can have a full belief in or conviction of Infinite Space, but cannot positively construe it in thought. With SPENCER, the Infinite is a positive element of thought which we are bound to accept, a real existence which we must positively concede, but yet which we can never know, and that for two reasons ; first because we can nowhere in thought subtend or comprehend *all* of the Infinite, and next because knowing is the process of establishing relations between a subjective knowing principle and the object known ; but there can be no relationship between the finite and the Infinite ; the human Mind is finite, Deity, Space, and Time are infinite ; therefore, there can be no relationship between the Mind and Deity, Space, or Time ; and as a last conclusion, the mind of man cannot comprehend Deity, Space, or Time ; they constitute the great Unknowable, of which we dare not predicate any property, quality, or condition.

The first argument that we can not know Deity at all because we cannot fully comprehend him, if logically carried out, would make all knowledge impossible because there is nothing in nature that is ever fully and completely known. By the argument the mason who squares his block of granite does not know it because he can not grasp understandingly all the granite in existence with all the neces-

sary attributes of its existence ; and the engineer cannot know the force of the steam pressure in the boiler at all because he can not comprehend all the laws of dynamics and pneumatics.

But the other is the principal point in the discussion. Deity is utterly unknown to us because He is infinite, and we are finite. But this has already been answered by the consideration that we do not so think Deity, or anything else for that matter,—by the consideration that the central and essential element of the idea of the Infinite is not as supposed by COUSIN, HAMILTON and SPENCER at all, but at the most as in Space and Time, a definitely limited idea refusing to be held in limits ; while in Matter and Causation it is an idea positively and definitely limited without any tendency to transcend limits. Therefore were it admitted, which it is not, that *knowing* is *relationing*, and that there can be no knowledge except where a quantitative relationship can be established between the knowing mind and the object of knowledge ; still, there is no bar to the human intellect comprehending Deity as fully as we know him at all, as fully as we know anything else, for we comprehend nothing fully and never know him as the Infinite. So, MR. SPENCER's argument for an unknown and unknowable cause in Nature breaks down on all sides. The truth is that our knowledge of Deity is not only coextensive with our knowledge of Nature, but just as positive and certain as the latter knowledge. Science and Philosophy are the expositors of the Great and universal Cause. As they enlarge their domain they enlarge our knowledge of Deity to the same extent. The facts of Science never militate against the doctrine of Deism and the knowledge of Deity. It is only unwarranted scientific hypothesis, and airy flights of metaphysical abstractions which favor Pantheism, Atheism, or Agnosticism, or teach the Unknowability of Deity. When we have diligently studied the works of a great painter, a great sculptor, a great architect, or a great poet, he can not be said to be wholly unknown to us.

Our knowledge of him will not be complete, but just as nearly so as we have been able to trace his genius, the trend of his feelings, and his life thoughts and life-purposes in his remains. So with God's Universe about us; if He is the entirely Unknown and Unknowable to us, it must be because we close our eyes, our minds, and our hearts to the infinitude of thought-picturing and thought-sculpturing He is crowding upon our attention on every side.

ST. GEORGE MIVART says : "To obtain the best attainable conception of the First cause is not to refrain from *the only conceptions possible to us*, but to seek the very highest of these, and then declare their utter inadequacy."

And so PROF. BASCOM: "Is it not better to conceive, is it not philosophically more exact to handle, the power and knowledge of God as we actually find them, under a finite form with the suggestion of infinite scope, than to strive after them as they are nowhere presented under an infinite form."

MECHANISM.

Generally, physical sciences assert "that all forces are native to and resident in the Matter of the universe, that they are uniform in total quantity, but subject to metamorphoses into each other under certain definite and positive laws, incident to and inherent in them. That this is not a sound philosophy I have demonstrated in "Genesis of Nature;" but it is the basis of the ordinary scientific notion of Mechanism, of which three phases may be noted. First, where, as in the Solar System or the oceanic tides an original artificer is not admitted, and where the running power is not artificially applied; next as in the watch where it is conceded that there was an original designer and maker, but the motions of the machine are occasioned by inherent natural forces; and lastly, as in crystallization where atoms or molecules, by reason of intelligently directed forces inherently native to them, move with a geometric regularity which produces symmetry of form.

Now it is clear that in reality the running-principle of these three phases of machinery are the same, that is that natural forces resident in its several parts or passing into them from sources outside, by reason of their inherent laws, and without intelligent direction from any exterior or superior source, so balance and co-ordinate with each other as to produce all the phenomena exhibited by the machine. Ordinarily, when in philosophy or science, Mechanism, or mechanical processes, are spoken of, the term is used in this sense. And I have so used it in this work, but I want to explain, simply as a term for that particular system of physical philosophy ; for I do not concede that it is by any means a just or adequate notion of Mechanism.

The DUKE OF ARGYLL says : "The very idea and essence of a machine is that it is a contrivance for the distribution of Force with a view to its bearing on *special purpose*." I would define Mechanism as the plan or outline of a machine, and say that a machine is a number of material organisms, parts or bodies once for all so reciprocally situate that natural or applied forces will act and react through and upon them in such manner as to produce a series of regular or harmonious actions which are mutually reciprocal between the several bodies so related, without the continual oversight, supervision, or readjustment of such relations, or of the forces concerned, by some superior intelligent power, and which by their co-ordination tend to produce some purposive end.

A watch is such an instrument. Here a number of bodies have been so placed, that when once wound up, the forces of nature, elasticity, cohesion, etc., will, for a number of hours, produce a series of regular and reciprocal actions without any further attention from the maker or the owner. These natural forces are always present and always act in the same way, when the same series of material bodies are placed in the same relative positions towards each other, and towards any source from which the supply of any of

the forces may flow. The original placing of these bodies was necessarily an intelligent adjustment to the composited balance or resultant of all the forces concerned. But after such placing, the intelligence by which it was planned, ordered, or accomplished needs to give it no further attention.

Life has been considered such a machine by Materialists. But when that subject is reached, the immense difference between the two principles will be shown.

NATURE.

The term *Nature* comprehends all phenomena, all being and processes of becoming open to our observation ; excepting only such as is or has been produced by intelligent human purpose. It consists only of processes and accomplished results of processes ; that is to say, the productions of Cause not of human purposiveness. Therefore, it is not an essence, not a principle, and cannot be an actor or producer. But the term is frequently used, even in philosophical works, as if its meaning were equivalent to that of Actor or Cause. Thus BUCHNER :

“ Nature’s own action is moulding her form without any previous design. But since this action had occasion ever to develop itself under external and internal circumstances that were slowly and gradually changing in every direction in a uniform manner and without interruption, it is obvious that an apparent order and an apparent plan should have arisen. The laws by which Nature works and acts are not laid down and dictated to Nature by some lawgiver standing outside or above Nature.

“ Now, Nature by her power whether in one fashion or another brought forth the first materials and form of life ; by her own power she caused these to develop further and further. The work of Nature is wholly spontaneous. And Nature knows neither a supernatural origin nor a supernatural continuation ; she, the all-bearing and all-devouring, is her own Alpha and Omega, her own generation and death. It is

perfectly obvious that Nature does not act from a conscious design or plan, but obeys a blind necessity. And Man is not a work of God but a product of Nature.

"So Nature knows neither psychical nor material conditions imposed upon her from without. From the beginning to the end she has evolved organically out of herself." (*Force and Matter*, p. 379.)

Now it is clear that in these extracts Nature is not considered, as she truly is, a mere process, an unfolding and becoming with the results thereof; but as a *doing principle*, a *compelling something*, a *creative and producing energy*. She is given activity, power, individuality, and personality. That is, BUCHNER deifies her. He first dethrones God and then enthrones Nature in His stead. This he is enabled to accomplish by emasculating or masquing the very essence of the idea of Cause in the process. He says there is no need of an intelligent Cause as author of the Universe; blind Nature, working blindly, can do it all; and when we get down to Nature we find her not any entity at all; not any existence whatever; but only a process with its resultants; only a moving panorama. BUCHNER will have it that the process drives itself, that the panorama is self-moving without any power behind. But it is not so to us. We cannot by the laws of thought look upon the panorama without believing an adequate Cause somewhere behind for its motions.

MR. DARWIN does not intend such erroneous use of the term, for he says: "I mean by nature only the aggregate action and product of many natural laws." However, he saves himself from personifying Nature only by personifying Law. And amongst his followers it is very common to find Nature used very nearly, if not quite, in BUCHNER'S sense.

LAW.

It may first be noticed that, like Nature, Law is often illegitimately personified and deified as in the

sentence just quoted from MR. DARWIN. It is made an *actor*, a *producer*, a *creator*, a something compelling the becoming of phenomena. This is one of the means to which philosophers resort in falsely persuading themselves that they are Atheists. They substitute the term *Law* for Cause or God, and vainly imagine the work is done.

Thus BUCHNER again : "Nature's laws themselves have created the mind." "Both the macrocosmic and microcosmic worlds obey, at every stage of their genesis, existence and subsidence, the *mechanical* laws which lie in the very nature of things. No conceivable power is able to escape from its necessity." DU PREL says : "In the whole universe not an atom moves except by law." JOUVENCEL says : "In neither chance nor miracle do I believe, but in phenomena produced by law only." All this is substituting Law for the correct notion of Cause. But others make Law simply equivalent to Necessity. Thus MOLESCHOTT says : "Natural law is the most stringent expression of necessity." And GEORGE HENRY LEWES says : "Necessity simply says whatever is, is, and will vary with varying conditions." All this is simply making Law the *scientific* notion of Cause ; that is the logical notion of Cause with the notion of Necessity added ; it is simply saying Law necessarily does this or that, causes this or that.

PROF. FISKE says : "A law of nature as formulated in scientific treatises, is a statement of facts, and nothing more, an order of sequence among certain phenomena." MR. DARWIN says : "I mean by law only the ascertained sequences of events."

And J. S. MILL says : "If necessity means any mysterious compulsion apart from simple invariability of sequence, I deny it as strenuously as any one."

But says DR. W. B. CARPENTER : "To set up these laws as self-acting, and as either excluding or rendering unnecessary the power which alone can give them effect, appears to me as arrogant as it is unphilosophical. To speak of any law as regulating or governing any phenomena is only permissible on the assumption

that the law is the expression of the *modus operandi* of a governing power." (P. S. M. Oct. 1872, p. 700.)

Now what is Law? It is "a rule of action;" the way or manner in which Mind or Force acts or behaves in the production of phenomena. As the term applies to the behavior of both Mind and Force, it necessarily includes two branches. Mind being self-active, must in the last analysis contain within its own essence the rule of its own conduct; it must in the nature of things be a law unto and for itself; it must be uncoerced and unconstrained by extraneous powers or conditions.

We can not say, that necessarily, in the very nature of things, Mind should control forces; but we find that it does do so; it does place upon them requirements as to behavior; and these requirements are Laws; the physical or natural laws of science. *How* Mind compels Force to obey its requirements, we do not know. We are entirely ignorant of *how* it enforces its physical laws; *how* it compels movements in certain lines of action. We only know that it does do so; at least, it does so, if we are correct in our contention that Mind is immanent in Nature; that the Universe is God-created and God-governed. And here is one of the sharp lines in philosophy and ontology, if Mind gives law to Force, there is a governing God; if Mind does not give law to Force, there is no God. Philosophers may stand astride this line, but never logically.

Physical laws, then, are rules of action or behavior, imposed by God himself, in some way unknown to us, on the forces which are immanent in Nature. Certainly these rules are all intelligently and purposively formulated and enforced; whether there be an understanding intelligence in the forces themselves, knowing to obey, we can know nothing about. They *do* obey, and there we stop.

LAW NOT IMMUTABLE.

But here arises the question of largest moment in the discussion of the subject of Law. Are natural

laws immutable ? So say all the materialists ; so say almost all scientists ; so concede a vast proportion of the most enlightened Christian authority of the age. BUCHNER says : "Natural laws are immutable, inaccessible to caprice or outside influence, and as eternal as matter and nature itself. Nothing can happen in the universe except as the result of natural laws. Rigid inexorable necessity rules the whole and the course of Nature." Says DR. PAUL CARUS : "Upon the rigidity of law depends the uniformity of nature and without the uniformity of nature science would be impossible." Says PROF. C. F. PEIRCE : "A physical law is absolute." If these philosophers are correct in the proposition of the immutability of law, then BUCHNER is right in his conclusions, practically at least, that there is no God in Nature.

If these laws are immutable, neither God nor anyone else can loose, undo, or change them. They will always be just as and just what they are ; they always have been just as and what they are,—since when ? Since their establishment in the beginning, whenever that was. If this be true, whatever once may have been the case, God does not *now* rule Nature ; He does not *now* control and compel Forces ; He does not *now* give and enforce physical laws. No logic and no sophistry can meet this issue. So far as the present government of the universe is concerned there is no God ; it is all iron Necessity ; and when our deepest and innermost thought evolved of, by, and from the very constitution of our intellectual being testifies to a *present* cause for all the phenomena of Nature, to a *present* something everywhere compelling a becoming to be, it testifies to a falsehood. Implanted on the bottom rock of our intellectuality, from whence no power and no device can drive it away, or tear it up, is the knowledge of God in the form of an everywhere present, efficient, purposive, active cause ; and, if law is *immutable*, that knowledge is a snare and a deception.

In one of the most powerful arguments that I am acquainted with in philosophical literature, the DUKE OF ARGYLL says : " It is perfectly true that every law is, in its own nature, invariable, producing always precisely and necessarily the same effects,—that is, provided it is worked under the same conditions. But then, if the conditions are not the same, the invariableness of effect give place to capacities of change which are almost infinite. It is by altering the conditions under which any given law is brought to bear, and by bringing other laws to operate upon the same subject, that our own Wills exercise a large and increasing power over the material world. And be it observed—to this end the uniformity of laws is no impediment, but, on the contrary, it is an indispensable condition. Laws are in themselves—if not unchangeable—at least unchanging, and if they were not unchanging, they could not be used as the instruments of Will. If they were less rigorous they would be less certain, and the least uncertainty would render them incapable of any service. No adjustment, however nice, could secure its purpose if the implements employed were of uncertain temper.

" The notion therefore that the uniformity or invariableness of the Laws of Nature cannot be reconciled with their subordination to the exercise of Will, is a notion contrary to our own experience. It is a confusion of thought arising very much out of the ambiguity of language. For let it be observed that, of all the senses in which the word Law is used, there is only one in which it is true that laws are immutable or invariable, and that is the sense in which Law is used to designate an individual Force. Gravitation, for example, is immutable in this respect—that (so far as we know) it never operates according to any other measure than directly as the mass, and inversely as the square of the distance. But in all the other senses in which the word Law is used, laws are not immutable, but, on the contrary, they are the

great instruments, the unceasing agencies of change. When, therefore, scientific men speak, as they often do, of all phenomena being governed by invariable laws, they use language which is ambiguous, and in most cases they use it in a sense which covers an erroneous idea of the facts. There are no phenomena visible to Man of which it is true to say that they are governed by invariable Force. That which does govern them is always some variable combinations of invariable forces. But this makes all the difference in reasoning on the relation of Will to Law,—this is the one essential distinction to be admitted and observed. There is no observed Order of facts which is not due to a combination of Forces; and there is no combination of Forces which is invariable,—none which are not capable of change in infinite degrees. In these senses—and these are the common senses in which Law is used to express the phenomena of Nature—Law is not rigid, it is not immutable, it is not invariable, but it is, on the contrary, pliable, subtle, various. * * * * *

“Now, the laws of Nature appear to be employed in the system of Nature in a manner precisely analogous to that in which we ourselves employ them. The difficulties and obstructions which are presented by one law in the way of accomplishing a given purpose, are met and overcome exactly on the same principle on which they are met and overcome by Man—viz., by knowledge of other laws, and by resource in applying them,—that is, by ingenuity in mechanical contrivance.” (*Reign of Law*, p. 58.)

There can be no question of the soundness of this argument in the main. Man does continually produce physical results or changes by co-ordinating or readjusting natural Laws, by setting one law off against another or supporting one with another. And in Nature we see such co-ordinations and adjustments on every side bearing the impress of purposiveness. But is it true even that “Law in the sense in which it is used to designate an individual Force,” as

exampled in Gravitation, is "immutable or invariable?" Does not the concession that Man can control physical forces by adjusting and co-ordinating them negative the proposition? How can he adjust two "individual," immutable forces without bending or changing one or both of them? Without his interference, they would, by reason of their immutability remain unadjusted, remain apart, distinct; how can his interference bring them together while they remain immutable? I think the two propositions are openly contradictory; we know Man does control forces; then all physical forces are not immutable; which of them are so? The very phrase "altering of conditions" implies a bending of laws, since all conditions must be co-ordinated results of Law.

I lift the pen to write; Gravitation does not loose its grasp on the pen, but is opposed and to an extent overcome by another force, muscular force. Which one of the physical forces is muscular force derived from? Physiologists are not agreed about this, but one thing is certain, my Will has dominated and bent *some* physical force, made it do what it otherwise would not have done: to wit, to appear as muscular force in my arm and hand in opposition to gravity. What next? The unknown force which has been coerced into appearing as muscular force, still acting against gravity, guides the pen into the ink, and this gives *occasion* for the action of a new force, capillary, and the pen takes up ink. Then again, the unknown force hidden in muscular action takes up the pen, guides it over the paper, and now gravity aided by muscular pressure lets the ink down; and so these lines come to be written,—written through and by the *bending* of *immutable* unchanging individual forces? And so it is with all Man does. Without the capacity of changing and controlling some physical force, so as to compel it to appear and do service as muscular force, he would be as inert and helpless as a clod. Indeed, this is the great primary differ-

ence between living and non-living matter. The former can and the latter cannot convert some one or more of the individual physical forces, can bend them into the form or mode of muscular or motive force, and the latter cannot. Deny this power to living beings and we are forced back once more on the rock of Necessity as the only alternative explanation of Life.

Then what may we understand by unchangeable Force? This I think: Individual *physical forces* are *unchangeable, except in co-ordination with other forces where they may be modified, composited, or neutralized, and dissipated according to certain physical laws*; and *except as they may be adjusted and controlled by Will*; and *physical Law is unchangeable, except as it may be dominated by Will*. That is, the forces of inorganic Nature are endowed with such principles and act under such laws that they mutually balance and adjust with each other in the production of all the varying phenomena of lifeless Nature, without any special supervision of Will; this under important limitations to be hereafter discussed; but organic Nature is possible only on condition of the domination of certain of the physical forces by Will in the production of vital actions. This domination means, to that extent, a domination or suspension of the physical laws governing these forces. To that extent physical Law, as we see it in Nature, is *not immutable*.

Many reflections of deep moment may find standing room here. If Man and all else having Life can bend, and control, and use the individual physical forces, where alone the DUKE OF ARGYLL's masterly logic leaves any semblance of immutable Law, then Life must be superior to physical forces and cannot be a mere resultant from them. If Man can control natural forces, much more can the Supreme Will do so. Again, if Will dominates forces and Law, Nature cannot be a system of Necessarianism. So it is apparent that there is even much more in the DUKE OF ARGYLL's great argument than he has made of it. Indeed, he has unfortunately left it in such attitude

that it is liable to be turned against what he felicitously calls "super-materialism."

Counting on such absolute immutability, LAPLACE said: "A mind which at a given moment should know all the forces of Nature, as also the respective situation of the beings of which it consists, provided its powers were sufficiently vast to analyze these data, could embrace in one formula the movements of the largest bodies in the universe, and those of the smallest atoms; nothing would be uncertain for such a mind, and the future like the past would be present to its eyes."

These profound reflections are true on condition, and *only* on condition, that there is no *free volition*, no *Will*, no *purposing Mind* anywhere in the Universe; that is to say, on the condition that law is absolutely immutable. For if anywhere there be any self-activity in nature carrying within its own bosom the springs of its own action, the realization of such action would of necessity set at naught some natural law or laws, and thereby baffle the calculation and foresight of the superior mind imagined by LAPLACE. So here, as everywhere, these materialistic philosophers only invoke *absolute Necessity* when they appeal to immutable law, and it is only the continual recurrence of the antithesis between Will and Destiny.

ORIGIN OF LAW.

One further question demands attention here. What is the origin of the "Laws of Nature"? There are four possible answers. They are accidental; they are eternal; they were evolved; or, they were formulated by Will. The fact that they are capable of harmonious co-ordination sets aside the first hypothesis. The second is really no better, for if eternal, it was still but chance that they should harmonize as they do. PROF. C. F. PEIRCE sees this, so he assigns them to Evolution: "Now the only possible way for accounting for the laws of nature and for

uniformity in general is to suppose them the results of evolution." (*Monist*, p. 165.) But the great *desideratum* with Evolutionists is and has been to find a law or laws of nature that will assuredly justify the urgent demand, *Is natural law adequate to account for Evolution?* and PROF. PEIRCE turns around and says the only possible chance is for Evolution to account for natural law. Nowhere, perhaps, in scientific reasoning could a more perfect vicious circle be found. DR. PAUL CARUS rightly replies to this, I think: "Whatever generalization the theory of evolution may be capable of, it is certainly not capable of being applied to law," (*Ibid.*, 243), for, if Evolution is true at all, it must be a process according to rule or law; law must have been precedent to evolution and not evolution to law. Nevertheless, PROF. PEIRCE is undoubtedly right when he declares: "Uniformities are precisely the sort of facts that need to be accounted for. That a pitched coin should sometimes turn up heads and sometimes tails calls for no particular explanation; but if it shows heads every time, we wish to know how this result has been brought about. Law is *par excellence* the fact that wants a reason." But it wants and must have some deeper reason than a doctrine underneath which Law itself must lie as a foundation. If Evolution is offered as an explanation of Nature, we demand an explanation of Evolution. *Law* is the only explanation for it that ever has been or ever can be tendered. In turn we most urgently call for an explanation of Law. PROF. PEIRCE says we are entitled to it more than any, but he has nothing possible to offer other than Evolution itself, that same Evolution which has just been explained by Law. Now we are entitled to something far better than that, and until it is brought forward we have a right to insist that Evolution itself stands without explanation.

As MR. SPENCER has well shown, some principle of existence must be primordial and irreducible. I

have elsewhere shown wherein MR. SPENCER is wrong in considering Persistence that primal principle. PROF. PIERCE says Law is derivative and needs to be accounted for. I agree with him so far, but it is not a product of Evolution as he insists, since it underlies instead of overlying that doctrine. What then is that primal, irreducible principle of which nothing else is explanatory, but from which all else must be derived, and by which all else must be explained? I answer that it is Will—Will which dominates all phenomena and formulates all Law. Therefore I find the origin of Law in the purpose of Will. Law is the expression of Will. Without Will there would be no Law.

CHAPTER III.

ONTOLOGY.

THE science of being may be studied on three different methods: First, the historic, giving an account of the various opinions held by different peoples under different systems, and in different ages, with an outline of their growth and numerous connections and dependencies; Second, the objective or scientific, in which the notion is inductively established from the facts of nature; and, Third the subjective, in which conclusions are reached through conscious introspection and metaphysical reasoning. The first method does not concern us here, but the second and third demand some attention.

The theories advanced as to the character of existence underlying the processes of Nature may be divided, primarily, into Atheistic and Theistic. Atheistic theories may be subdivided into Absolute, Causal, and Ideal; and Absolute theories again into Casual, Necessary, and Relative. So Theistic theories may be subdivided into Necessary and Purposive. Necessary Theistic theories subdivide again into Pantheism and Cosmism. Pantheism may be again subdivided into Materialistic Pantheism, Dynamic Pantheism, and Idealistic Pantheism; while the latter division again separates into Impersonal, and Personal Idealistic Pantheism. Once more, Purposive Theism may be subdivided into Predeterminative and Volitional.

This classification may be set forth in the following scheme :

Atheism.	Absolute.	Causal. Necessary. Relative.
	Causal. Ideal.	
Theism.	Necessary.	Pantheism Cosmism.
		Materialistic. Dynamic. Idealistic.
	Purposive.	Impersonal. Personal. Predeterminative. Volitional.

ORIENTAL FATALISM, or Destiny, has no philosophical basis, and therefore finds no place in any ontological scheme. It simply means that certain ends or outcomes of being are immutably fixed irrespective of any antecedence ; that the result will be the same no matter what comes before. It is Necessity, but Necessity without order, antecedence, or sequence.

The various ontological theories of the universe may be compared to a vast piece of machinery made up of an infinite number of whirling wheels, some immense in dimensions and momentum as the solar system, some infinitesimal as microscopic infusoria. The force of the illustration will lie in the varied characters of the causes or powers by which and the manner in which this supposed huge mechanism must be run under the different systems.

CASUAL ATHEISM.

This theory holds that there is no cause, no purpose, no reason for any transaction that occurs ; that any event might just as well and just as likely transpire in some other way, or in any other way, as in the way which it does. It is chance, accident,—absolute in that that it knows neither cause nor reason.

By this theory the machine is run without rule or

law. Each of its infinity of wheels exists as it does, and moves as it does, not from any over-compelling necessity, but just simply because it happens so. It might just as well and just as likely not have been at all, or been run in some other place, or whirled more slowly, or more rapidly, or in the reverse direction. Upon the apparent collocation of movements of wheels in groups, certain other wheels, in the form of inanimate or animate phenomena, appear and take on motion, not by reason of such grouping of the prior revolving wheels but with perfect accidental spontaneity.

Now there are two arguments against an accidental theory of nature, either of which seems sufficient. The first is derived from the necessary nature of human thought. Chance is unthinkable, as before insisted. We of necessity think a *cause* for every occurrence. When something is done we always think something did it. Now it is not logically certain that existence is always just as it is thought, it *may be the reverse*, but we are under the compulsion of believing it as we necessarily think it, on the penalty of stultifying reason and discrediting all our mental faculties. Things may exist and facts may be true, for aught we know, which we cannot think, nor even conceive; but when we are forced to think a thing by the very constitution of our minds, it must be true to us, however it may appear to Supreme Wisdom, and if we do not so recognize it we set our own intellectual capacities at naught and bring all argument and all reasoning to a period.

The second argument is an induction from the facts of nature. System is seen everywhere; everywhere plan and purpose are simulated. Now, under the reign of Chance, the odds would be as infinity to one against the happening of all things on system and along the lines of purpose as we find them in nature. The odds are as infinity to one, therefore, that Purposive Power, and not Chance, rules the universe.

NECESSARY ATHEISM.

This claims that things do not occur by *Chance*, nor yet from *Cause*, but of *Necessity*; that consequences follow antecedents because of necessary laws imbedded in their very existence; that all Nature is but a series of sequences, a succession of necessary but uncaused events. It sees only things and motions. Therefore it is essentially materialistic; in fact, the only pure form of Materialism. In this work, however, I have used the term Materialism as a general expression designating all that large class of thinkers who make of Nature a *mindless mechanism* by denying a vital principle.

In this theory no one of the wheels of the machine could possibly be absent, or run with different motion from what it does. No one of them could possibly fail to appear when it does, or disintegrate when it does. And yet, it is all *causeless*. There is no *compelling power*. The spinning of the wheels go on and on, as they have from eternity; because, they *have to*, from a necessity within themselves, and not from any outside pressure or influence. By an inherent and individual necessity each wheel, for itself, is set in its own particular place and time, and with its own peculiar motion. But no one of them turns because another does or did. There is endless juxtaposition in space, and concatenation in time, but no *causal connection*. It is all without *Law--Fatalism*.

This category differs only verbally from the preceding, and the like arguments stand with the like weight against it; for, predicating as it does a necessary sequence of events without cause, or causal connection, it by indirection asserts the only possible alternative, a *causeless*, that is an *accidental* succession of fortuitous occurrences. This is the necessary logical result of that theory of a certain class of physicists who would eliminate both the *idea* and the *term*, "cause," from their philosophy.

RELATIVE ATHEISM.

This theory supposes all existence to depend on relationship; that one thing exists because others do, and moves because others do; that if all other existences with which it stands in relation should be extinguished, it would necessarily cease to be. Each of its wheels move because the others do, and not either accidentally, or because of any compelling power, or extraneous reason. The system finds all cause for itself in itself; it is its own cause; therefore, it is a branch of Necessarianism and all the arguments against that philosophy apply. It seems to have been suggested by the relative motions of all known bodies growing out of the laws of gravitation as well as those of molecular forces. It is in effect saying: "Thus we find things related, and therefore, thus they must be related of necessity; we find them behaving so and so towards each other, therefore they are and were from the beginning compelled by reason of their own essential character to behave so and so towards each other; and, therefore, such *behavior* towards each other is the supreme and only necessary cause of their own existence." But the logical force of the argument is not apparent. It is only explaining that, It is because it is.

CAUSAL ATHEISM.

This admits an impersonal, unconscious, unintelligent, unvolitional cause for all phenomena. It says that, by reason of the absolute constitution of Nature, all change is compelled by some Power, Force, or Cause, without any direction or control of a superior Will. In one sense it is Chance again, since it is in no way dependent on plan or purpose. It differs however from Necessary Atheism, at least verbally, both in predicating a causal connection or substratum for all sequences and an eternal necessity for all the modes of such causal

principle, since it makes each mode to grow out of a prior mode by reason of the eternally inherent character of the Cause itself.

Here the machine is driven by Cause. It is compelled to all its movements precisely in manner and form as they occur. It is under Law; that is, the necessity of particular movements by reason of the Cause over it. The Cause is necessary and eternal. It is what it is, and cannot be and could not have been different. It can suffer no change in essence, in constitutional being, in its own inherent necessity and character. It is unintelligent and non-volitional. It is in no sense personal. It is non-purposive, originates no plans; it works not by system but by necessity.

The Cause is usually denominated Force. Therefore, on this theory, Force is an eternal and inevitable necessity in essence and action. The theory of the Conservation of Force holds that all Force is eternal, that no new Force has ever come into play, that Forces metamorphose into each other but remain constant in essence, quantity, and potency. It is not seen how this varies the character of the machine of nature under the aspect now under consideration. It is run by eternal Forces which change in form and mode but never in essence; Forces which do not increase nor suffer diminution, Forces which receive no extra support or control from without, and are modified by no exterior Power. What is this but absolute Necessity? Where does it leave room or place for Divine control or interference? A whirling, spinning universe compelled to all its actions by eternal, self-modifying, and essentially quantitatively unchanging Forces, which do not and cannot suffer outside interference or modification—what differs it from practical Atheism? In no essential that I see, for it predicates a certain volume of Force at the beginning which has never increased or diminished, which has “held in its own bosom” from eternity all the potency and character which it has ever mani-

fested, and which has evolved all nature through a process of unceasing metamorphoses from one form into another. If Causal Atheism is true, it carries with it the doctrine of Conservation ; if Conservation is true, its equivalent expression, Causal Atheism, must be ; for, it must be that if any extraneous control is exercised over the forces of nature, they in so far receive new potency and virtue, and become impressed with new characters ; something is added to the sum total of the energy of the universe, and the doctrine of Conservation is negatived. Now in "*Genesis of Nature*," by a great variety of arguments, I have shown that Conservation of Energy can, at best, be true to an extremely partial degree ; and that doctrine failing, Causal Atheism fails with it. And as the original constitution of all force, by reason of which it compels all change and phenomena as we find it in the universe of Nature, was and is causeless, as we can simply say it was and is just so *because it was and is just so*, the second argument against Causal Atheism seems to apply here with equal force ; for the odds are, here also, as infinity to one that the original constitution of the creative forces of Nature should have been otherwise and produced some other character of universe, rather than the semblance to intelligent plan and purpose which we find.

Another thing to be observed is, that this theory necessarily eliminates from nature every notion of an organizing principle ; a vital principle ; a principle laying hold of, co-ordinating, and adjusting forces in the production of minor systems or organisms. It reduces all this, in every instance, to simple processes, continuous for longer or shorter periods of time ; to resultant motions of collocations of forces, brought together in necessary spatial congeries and time sequences, by reason of a consecution of cause and effect, reaching back through all eternity. Life is simply and only such a process or resultant of collocated forces ; only the accumulated and continuous

resultant of the motions of an adjusted system and series of whirling wheels in the great machine. And Mind itself is but a phase of Life, a resultant of the movements in a contained and still more subordinate system. And being processes merely, Life and Mind cannot be entities with faculties and attributes. They cannot be essences or beings. They are and can be nothing but successions of phenomena; resultant phases of self-adjusted motions; only the whir of the bur-stones of the eternally grinding mill of the universe.

From which two corollaries follow: Life and Mind are the children of eternal Destiny, "fixed fast in fate," beyond all tiny efforts of struggling man to modify or control. And next, they cannot survive dissolution. When the Mill stops grinding the whir is no longer to be heard. When the wheels drop apart or cease to turn, the co-ordinated motion, the *process*, must cease with it. DR. EMILY WHITE asks: "When a machine is taken to pieces, or falls into decay, what becomes of the forces previously manifested by it? Have they gone off in some associated way, to manifest themselves elsewhere in manufacturing carpets, impelling railroad trains or printing newspapers as determined by the original construction of the machine which they have deserted?" A most pertinent question to those who advocate the doctrine here discussed. The logical outcome of Conservation makes Man, body and mind, no more than a machine run by natural forces; when the machine fails and falls to pieces what becomes of the Mind? Absolutely Conservation can make but one possible answer: "Mind, being only the result of a co-ordination of forces and organs, must fail when these fall apart."

On this theory BUCHNER is consistent: "By the breaking up of its material substratum and the dissolution of the combination by which alone it attained conscious existence and became a person, a period is put to the existence of the intellectual being which

we have seen grow up on this double ground." (*Force and Matter*, p. 381.) And again: "The soul is only the effect or product of a definite combination of materials and forces subject to disassociation. With the breaking up of their combination, its working must necessarily come to an end." (*Ibid.*, 403.) CARL VOGT says: "Physiology declares against immortality. The psychical activities altogether cease with the death of the brain." And BURMEISTER says: "The soul ceases to exist at the moment of death." Granting Conservation of Energy there is no logical avoidance of these conclusions.

IDEALISTIC ATHEISM.

This theory holds that there is no existence save the Mind and its conscious states, or sometimes, as with HUME, only Consciousness without the *substratum* of Mind; that the objective world is only a passing phantasm, a dream; that it is wholly unreal. The theory is generally classed under Idealism, but as it wholly discards Deity, it properly falls under the category of Atheism.

Says PROF. JOSEPH LE CONTE: "The ideal philosophy as usually understood regards the external world as having no real objective existence outside of *ourselves*—as objectified mental states of the *observer*—as literally such stuff as dreams are made off—as a mere phantasmagoria of trooping shadows having no real existence but in the mind of the dreamer, and each dreamer makes his own world."

In this theory the only machinery is that of imagination itself, the only wheels the thoughts and fantasies which seemingly build up an objective world. There are no Causes outside the substratum, whatever that may be, to this continuous *seeming*. The *seeming* is the only mechanism to be accounted for. Of course such a system stands outside the pale of argument, since there is no evidence to be urged either for it or against it; except, that practically, it

is not possible that any one should ever believe it or act upon it. It is a purely cloudland theory.

MATERIALISTIC PANTHEISM.

This predicates an impersonal and involuntary God whose necessary character it was and is to produce the phenomena of nature just as it appears. Hence it is scarcely otherwise distinguishable from Causal Atheism than as it includes in the underlying creative principle of nature, *matter* as well as force, and calls the extended principle Deity.

Says E. P. POWELL: "We can justly affirm intelligence of the universe subjectively for only the intelligent can work intelligently. * * * We do not find either an extra-natural Creator, or a conscious natural power or personality. * * * * The consistent evolutionist identifies Nature and God. * * * Evolution not only denies but disproves totally and forever the existence of a Being over and above Nature, by whose will we exist."

It assumes that the wheels of the machine themselves and the forces which move them are one in essence; and calls the whole combination God. God is the universe and the universe is God; but an essentially impersonal, and non-volitional God; a God without plan or purpose, from all eternity necessarily just what he is. This is only a slightly varied form of Fatalism; for a God who can neither plan nor will, and is what He is, and does what He does, because of an eternal necessity, is equivalent to no God at all. It is not He but eternal necessity, Destiny, which turns the wheels of the machine. Therefore, the second argument against Causal Atheism applies here, also, for the predicated Deity being unintelligent and involuntary, can evolve nature only through the original necessity inherent in the very character of His existence; and as such necessity must be supposed to have been *uncaused*, the question recurs, why should it have been just as it is,

rather than some other of the infinite ways in which it might have been?

DYNAMIC PANTHEISM.

This differs from the last category only in excluding *matter* from the Deistic principle in nature.

It differs only in name and in excluding matter, from Causal Atheism. What is there called Cause or Force, is here called Deity; with no additions attributes, potencies, or powers. Deity drives the wheels of the machine—which are as in the preceding category a part of Himself,—but this He does of a necessity, inherent in His very existence and without the faculty of changing, planning, originating, or willing. It is but a still different form of inexorable Destiny.

IMPERSONAL IDEALISTIC PANTHEISM.

This theory supposes an impersonal, spiritualistic principle pervading nature, or rather, which is Nature itself, and which, by its manner of impressing Consciousness, produces or rather causes, the notions of all the phenomena of external nature. As it must do this by reason of its uncaused, original, inherent constitution, it follows, that here, too, the second argument against Causal Atheism is applicable.

The God and the machine are one and the same, an impersonal, unintelligent, non-materialistic principle which, by reason of the necessity imbedded in its own being, impresses Consciousness with the notion of an external world of matter, force, and motion. The wheels of the mechanism are what and as we see them, and run by forces which are what and as we see them, except that instead of real material existence it is but a mode of spiritual existence, a mode of Deity. Cosmic Theism differs from this, first, in making the universe a partial instead of a total manifestation of Deity; and next, in holding

that what we think we see as an objective world of matter, force, and motion, is not *real* in any sense whatever, but phenomenal only.

PERSONAL IDEALISTIC PANTHEISM.

§ 68. Here also Deity and Nature are one, and the machine as we see it is only modes, though real modes, of Deity ; in this it is like the last category ; but differs in claiming that Deity is intelligent, personal, and voluntary ; that intentionally and on purpose Deity presents Himself to Consciousness in modes which are the similitudes of the matter, force, motion, life, and mind of the great mechanism ; that He is a real God. But like that it does not assume any external nature aside from such principle ; nor otherwise, than as it impresses itself on Consciousness. There are only two modes of existence, our own conscious principle, and Deity. Deity purposively impresses or implants the notion of objective nature upon Consciousness in the phenomena of thought. It may be remarked here, however, that this theory might just as well have been classed under the subdivision of Purposive Theism, as under Pantheism, for it is both ; the former as predicating a purposive God in creation ; and the latter as making such God the same with Nature itself, or rather, as making Nature a mode or manifestation of such God.

COSMIC THEISM.

Following PROF. FISKE, I apply this name to MR. SPENCER's system of ontology. This predicates Deity under the name of the Unknowable, of whom we cannot assert personality, or intelligence, or purposiveness, or will or any other human attribute. All existence, including human Mind, thought, will, and feeling, and also space and time, are but modes or projections of this Unknowable. But being only modes they of course can not present reality but

appearance only. The reality is in the Unknowable back of all ; the phenomenal only is the known. As no human attribute is predicate of the Unknowable, it can not be said that it *makes* anything, or *causes* anything to be, or that there is any intelligent or purposive action or manifestation of will in Nature ; for all these are human qualities or exertions of power. This system is admittedly founded on the Persistence of Force.

The machine is, therefore, run by forces which vary in mode but never in essence or quantity. One wheel is set in motion and turned by another or a congeries of others, which in turn were set in motion by a prior one or a congeries of prior ones and so on back through eternity, to the very dawn of existence. Each motion of each wheel is what it is by reason of such other concurrent or preceding motions, and those by others, and so on back forever. Not only so, but the wheels themselves are produced, or evolved, by these motions, and prior wheels by prior motions, etc. Every new wheel, as a plant or animal, is the result of the motions of a congeries of wheels, brought together by the whirling of other wheels, and these by others, and so on back forever, to the very beginning of existence. But the whole system of movements is a projectivity or resultant phase of the Unknowable. That is, the Unknowable is the cause of all the dependent and connected movements of all the wheels in the machine ; not however in the sense of a purposeful, intelligent, or volitional Cause ; but in the sense of being an infinite and eternal substratum of Being, which by reason of the elemental, inexorable, and essential laws of its very existence, necessarily projects itself into both the substantial entity and action of all the wheels in physical nature. And thus it happens that the wheels of the universe are driven by Cause, but a helpless Cause, bound, and shackled, and itself driven to all its performances by a stern and relentless necessity, inherent in and co-eternal with its very existence.

From all of this it follows here, as in Causal Atheism, that Life is but the sound of a grinding of a set of allocated forces upon each other—but the attrition of cogs turning upon cogs in collocated groups of whirling wheels.

Not only this, but thoughts, feelings, and Mind itself are but the results, or products of these motions; they are themselves wheels evolved by the concurrent or consequent whirling of other wheels; but processes having no substantial existence, being no more things, entities, and essential realities, than the blowing of a wind, the flowing of a river, or the sailing of a ship. They are unreal and non-essential *somethings* which cease to be when the wheels cease to move.

So it must be that every new wheel, and every peculiar motion of every wheel in the universe—every system, every organism, and every organ of every organism, if the symbol may be dropped for the moment—is the inevitable outcome of the character of the first motions, and of the primal condition and aspect of the Forces of Nature in its very dawn. Everything since has been natural, regular, orderly, necessary! No superior Power has interfered, nor in the inherent nature of things could have interfered. If there is and has been a God at all, it is as though He were not and had not been; so far, at least, as material nature is concerned. It is Destiny over again.

Nevertheless this system predicates a God, an unknown God it is true, the “Unknowable,” a God who is impersonal, unintelligent, purposeless and involuntary. As it has just been shown that it must be an absolutely necessary system because founded on Persistence of Force, it will here be observed that it must be so because of the character of the God predicated; a God who cannot know, and plan, and will, cannot, in the nature of things, be practically either an originator or ruler of Nature. The wheels move on irrespective and independent of such a God,

because of the essential necessity inherent in the forces which drive them. Or if it be granted that such a God is the necessary and absolute sub-stratum out of which the moving force emanates, it is not seen how the necessarian aspect of the great mechanical system of action and movement is obviated or varied by this. It is still absolute and inevitable rule and law, growing out of the essential necessity bottomed in the very constitution of things, whether the forces driving the machine have or have not a mechanical connection with and relationship to such a Deity.

And the theory does assume more than such connection, does assume that the whole of the visible universe, whether subjective or objective, is but a manifestation, projection, or mode of the Unknowable, of Deity ; that both the wheels, and the forces which drive the wheels of the machine, are but subsumptions of the infinite God ; that both the solid earth and the forces which sweep it around its central sun, the stars above and the rays of light which bring them down to us, the flowers of the garden and the molecular forces by which they are fashioned and woven, the knowing and feeling contents of consciousness and the Mind which knows and feels, are but Deity, the Unknowable *objectified*. But not all of Deity is by this theory so projected ; He rises above and beyond all such subsumption. The universe is only a *partial* mode of the Unknowable, not a mode of it in totality. The wheels and the forces which drive the wheels of the great machine are a finite mode and appearance of the Infinite Essence of all things. They are but "shows of the Unknowable." Yet all the time, what they are in reality and what they appear to be is by reason of an absolute necessity upon them.

But all this does not exhaust the theory. Such subsumption is not *real* but phenomenal only. The wheels are not *real* wheels, the forces which drive them are not *real* forces, the motions set up are not

real motions, the thoughts thought and the feelings felt are not *real* thoughts or real feelings, the Mind that thinks and feels and wills is not *real* Mind; it is phenomenal, all notional, a shadow of the Real impressed by itself on consciousness. Deity projects Himself not into *real*, subsistent, objective, and subjective modes of existence, but into phenomenal modes; and these have no other consistency than as mere impressions enstamped upon consciousness in two parallel congeries, subjective and objective. The machine is not a *real* machine, the wheels, and forces, and motions, ideas, and feelings, are but shadows or semblances of wheels, forces, motions, ideas, and feelings; as we see them not even *real* projections of the Unknowable into these several modes, but only semblances of such projections, presented to a Consciousness which is itself but a series of phenomena, of semblances of real projections of the Unknowable.

And not only so, but the phenomena while dependent upon actual modes of the Unknowable, are no counterparts of them, are neither types of them, nor antitypes to them, neither patterns nor likenesses of the presentations made of them. When the hand grasps the pen, it is not a real hand with a real motion laying hold of a real pen; as we know it in Consciousness it is not even one actual mode of the Unknowable, by means of an actual modal process of the Unknowable, connecting itself with another mode of the Unknowable; but only a semblance, shadow, or apparition of one mode, taking hold of a semblance, shadow, or apparition of another mode, through the use or instrumentality of a semblance, shadow or apparition of still another mode. So, whatever the Mind does, it is but a semblance of a mode of the Unknowable acting, the action produced but another semblance of another mode of the Unknowable, and the object acted upon still but a third semblance of a third mode of the Unknowable. And none of these semblances are *resemblances* at all, they are in nothing at all like the modes of the Unknow-

able which they represent. But they all occur in necessary sequence as they do, not because of will or purpose anywhere along the line, but because of an absolute and inherent constitutional necessity co-ternal with the Absolute, to so objectify itself in parallel sequences of modes and to compel the apparition of parallel sequences of semblances for consciousness to envisage, in time and place, just as the Mind apprehends them.

DR. FERRIER's graphic picture of the doctrine can scarcely be overdrawn, as he sets out the notion it affords of man: "Not the picture of a man; but the representation of an automaton that is what it cannot help being; a phantom dreaming what it cannot but dream; an engine performing what it must perform; an incarnate reverie; a weather-cock shifting helplessly in the winds of sensibility; a wretched association machine, through which ideas pass linked together by laws over which the machine has no control." (*Lectures and Phil. Remains*, Vol. 2, p. 195.)

Indeed, I hold that an analysis of the doctrine cannot show up any better. The objective world is a mode of the Unknowable, a phenomenon, in no wise like the actual substratum of existence and in no wise like it appears to us. Then the subjective world, the Mind and its furniture, is another mode or appearance of the same Unknowable, but still unlike its substratum and unlike what we see it. Then what must the process of knowing really be? A phenomenal Mind which is something different from what it appears to the thinker to be, by a process of thinking which is also something different from what it seems to be, grasps, in thought, objective modes of the unknowable which are also different from what they seem to be. It is all a masquerade. The Mind is masqued from itself, the exercise of its faculties are all masqued processes, and the whole objective world is wearing masques. Nothing is what it seems.

PREDETERMINATIVE THEISM.

This differs from Causal Atheism in this, that originally the machine of the universe was constructed on an intelligent plan by a personal Deity, who furnished forces for running it ever after, with the laws of their eternal future so impressed upon them that they can never waver from the primal plan, and since has given it no directive attention. In the two systems the origins of both the mechanism and the forces which drive it are different, but the running of the machines is after the same manner of necessity, by forces patterned in certain iron molds and independent of all exterior direction or superior control. In one there is no God to change or direct; in the other there is a God but He never changes or directs. So far as the mechanism of the universe is concerned He is as though He were not. This fills the notion of DR. McCOSH where he speaks of "that bald theism which makes God create the world at first and then stand by and see it go." And PROF. BASCOM says: "An Infinite One that cannot accept his own acts, lest he be broken up and lost in them, that looks more to the statics than the dynamics of being, is not the Jehovah of our thoughts."

VOLITIONAL THEISM.

This supposes an *objective world of matter, force, and motion, and a subjective world of thought, feeling, will, and mind.* Nature is a real existing mechanism with real wheels, driven by real forces acting under definite laws in the production of real motions. Above it all and over it all is an *intelligent, purposive, volitional God.* By His will and purpose He gives as the law of their existence and action, potency, direction, and character to forces, and adjusts, co-ordinates, and collocates them. So every wheel, and every system of wheels, move on plans, under rules,

and to ends given by Him. He dominates all action by dominating all force, all Cause.

Organisms are sub-systems of movement, dominated by sub-causes usually called vital, acting under rules and plans of His furnishing. Mind is another phase of sub-cause possessed of consciousness, intelligence, feeling, and will, manifested in connection with physical organisms under laws of His establishing. The great diversity between this and the other systems examined, lies first in the fact that the forces which move the wheels of the machine are not regarded as being eternally, necessarily, and independently unchangeable, but subject to the dominance of an intelligent Deity; next that such Deity is not only regarded as different from, and superior to both the material mechanism and the forces which drive it, but as being *personal, purposive, and volitional*; next that *Life* is regarded as an *entity* with a certain degree of dominance over the forces which run its localized machinery; and, finally, that *Mind* is an *entity, conscious, intelligent, purposive, and volitional*.

Having thus examined the supposed mechanism of each of the several ontological systems, seen the movements of its innumerable wheels and systems of wheels, learned how, in what manner, and from what source their movements are set up and carried on under each of the theories, the proposition of the sharp and clearly-cut line dividing Necessity and Purposiveness, and showing their utter incompatibility may be further emphasized. It will be seen that Necessity insists that every one of her wheels, and groups of wheels, of the whole infinite number, shall be absolutely left as she set and placed it, and run as she has directed and dominated from all eternity. If there be a Power which can lay a finger on a single one of them to regroup it, change its adjustment, take it out, reverse its motion, augment its speed, or slow it down, eternal Necessity is dethroned. On the contrary, if a Power of Intelligence, Purpose,

and Will, sets the gait of the universe, holds the keys to all the movements of its parts, directs and controls causes, readjusts systems, motions and forces, at free and personal option, then there is and can be no room for absolute Necessity. Necessity then becomes only a synonym for Law, and Law becomes the rule of action, imposed, for a time, longer or shorter, by the Supreme Power, on the forces and co-ordinated groups of forces with which He creates, or evolves, and runs the great machine of Nature. Such are the two absolutely irreconcilable theories. Let us keep the distinction in mind. Let us not attempt to sink and gloss over the difference, as is the manner of many. If we do, the result will be confusion and obscuration instead of clearness of thought. A very candid criticism of *Genesis of Nature* remarks that "HERBERT SPENCER's doctrine of persistence of force is just as consistent with dualism, just as consistent with idealistic monism as with extreme materialism." To say the least, this is very small compliment to MR. SPENCER. To say that his theory is equally reconcilable with three utterly irreconcilable doctrines is to affirm that either his doctrine or his expression of it is most expansively indefinite.

And PROF. SHOUP, while admitting that Mr. Spencer's form of expression has been most unfortunately ambiguous, thinks great injustice has been done in charging him with Materialism. He says: "It is to be regretted that his hostile critics have not dwelt more upon the phase which makes for the truth as they see it, and less upon that which is so obnoxious to them. Any number of passages could be quoted to show the anxiety of Mr. Spencer not to be set down as a materialist." The last proposition is certainly true. MR. SPENCER objects to being called a Materialist, and many isolated passages may be culled from his works standing right in the teeth of Materialism. Nevertheless, such passages are irreconcilable with and contradictory to his whole ontological and philosophical system. His first principles, both

in *First Principles* and elsewhere, logically lead to inevitable Materialism and practical Atheism, and there is no help for it, struggle as he and his friends may. In the passages referred to by PROF. SHOUP, MR. SPENCER's Theism contradicts his philosophy. It is his philosophy I am concerned with, and not his individual opinions which may or may not be in accord with it; the latter are of very minor importance compared with the basic doctrines upon which he has constructed his great system of universal philosophy; and I think it is not well to sugar-coat the error which permeates MR. SPENCER's whole system with the truths he has here and there uttered. The same may be said of PROF. SHOUP's defense of TYNDALL, HUXLEY and DU BOIS-REYMOND against the charge of Materialism. He shows that they repudiate the charge, and they should know what they believe. Nevertheless, their published theories of being lead to a bald Materialism without any remedy. They simply shrink from following out their own doctrines to the last logical step; they pause, they may even attempt to turn back at the brink of the precipice; but their philosophy leaves their followers right there; and I think it is not well that they should be excused on the ground that they entertain opinions which logically stare in the face of their own published doctrines. It may be well that these great thinkers can individually rise above the published error of their own systems, but it would have been far better if they had first weeded their systems of the error. If they cannot look the logical consequences of their doctrines in the face, they should have been content with teaching the facts of Science in their several specialties, instead of attempting to indoctrinate the world with new philosophies and new religions. Having put forth systems and theories which run counter to and undermine old established philosophies and faiths, they should either have the courage to defend them in their extremest logical results, or else withdraw them. That they are un-

willing to do the one and unable to do the other is no reason why they should be spared by those alive to the duty of distinguishing truth from error wherever possible.

NUMERICAL CLASSIFICATION.

There is another system of ontological classification proceeding on the *number* of the essential principles of being which it is supposed a last analysis discloses. On this system we have primarily Monism, Dualism, and Trinalism. Under Monism we have subdivisions, which may be called Attributivism, Materialism, Dynamism, Mechanism, Idealism, Psychism, and Nihilism. Idealism is divisible into Impersonal and Personal Idealism. Under Dualism we have three subdivisions, which may be designated as Materialistic Dynamism, Idealistic Dynamism, and Idealistic Materialism. Trinalism is not susceptible of subdivision.

This classification may be presented in the following scheme :

Monism.	Attributivism.
	Materialism.
Dynamism.	Dynamism.
	Mechanism.
Idealism.	Idealism.
	Psychism.
Nihilism.	Nihilism.
Dualism.	Materialistic Dynamism.
	Idealistic Dynamism.
	Idealistic Materialism.
Trinalism.	

ATTRIBUTIVISM.

Attributivists believe in an unknown substratum of existence, which is neither Matter nor Force in essence or fact, but one or the other in phenomenon according to the state or manner in which it is presented to the understanding. They argue that all we can know of either Matter or Force, or of anything

else for that matter, is simply subjective states of consciousness dependent upon physiological or cerebral conditions, which may or may not be occasioned by corresponding objective conditions, and of which other objective conditions, if such there be, we can have no further or other information than the experiences of these subjective states or phases of consciousness. The law of parsimony requires that we shall not unnecessarily multiply principles, agencies, or conditions in accounting for phenomena; we cannot say that it is necessary to assume two diverse objective conditions to account for the two orders of subjective conditions, and, therefore, it is unphilosophical to do so.

We can know neither Matter nor Force as *things*, as real existences; all we have of either is an inference drawn from the manner of its presentation in thought; and, therefore, it is more simple and philosophical to suppose one essence diversely presented, than two absolutely diverse forms of existence. "Mind is only in matter; matter is only in mind; the twain are one. * * * * By a process practically to us infinite, matter-material becomes mind-material."—E. P. POWELL. "Mind is the original property of the elements composing the substance of existence."—MONTGOMERY. "Matter and force are separable only in thought; in reality they are one."—A. MAYER. "The first and last word of Science will always be the indivisible union between or the identity of force and matter."—LEFEVRE.

The reply is that as a matter of fact it is true we cannot know the very essence of things as God knows it. We cannot know certainly that at the bottom, Matter, Mind and Force either are, or are not, the same in essence. What is impossible of being known it is useless to hold disputation over. But we do know that our conception of these three forms of existence are diverse, so very diverse that we need and are forced to have different terms by which to designate them. We do of necessity think them dif-

ferent principles in essence and being ; and so they are and must practically be to us, whatever theoretical value we may place upon them.

MATERIALISM.

Materialists consider Matter the only real or essential existence, and Force and Mind but attributes of Matter, or phenomenal forms of existence proceeding out of Matter. They argue thus : " We have no knowledge of Force disparate from Matter, nor of Matter which is not the habitat of Force, therefore we have every reason to presume that they are inseparable ; but as by contactual experience we are compelled to believe that Matter is a real resisting, space-occupying something, we must logically admit that Force is only an attribute or mode of the real something in which it inheres and out of which it proceeds.

" And, also, as we know nothing of Mind disconnected from Matter we have no right to assume that it is any other than an attribute or mode of Matter. We have experiential and contactual proof of the existence of Matter, but all else of which we have knowledge is, so far as our experience goes, indissolubly connected with Matter, and therefore we have no logical right to suppose any disparate existence." BUCHNER says : " Thinking and extension are to be regarded as two sides or phenomenal manifestations of one and the same single existence. . . . Thinking is and must be a mode of motion." SCHOPENHAUER says : " If matter can fall to the ground then it can also think."

But having arrived at the notion that objectively considered there are really existences such as we call Matter and Force and Mind, we next inquire whether the Materialists are right in considering Force but an attribute of Matter. The objections to this theory may be thus summarized :

1. Force may be accumulated in a body as in a falling weight.

2. It may be transferred from one body to another as when a moving body impinges upon one at rest.

3. It may be drawn off and made to do work as from a water-wheel, or the weights of a clock.

4. Force from several different sources, as from a falling weight, a steam piston and animal muscle, may be indistinguishably mingled and combined into one concentrated effort in causing movements of matter.

5. Force is continually coming from outside of what we know as material nature.

Now all these phases are something entirely different from what we expect of an attribute or quality. It is an entirely different order of manifestation from what we see in Matter when not the seat of force. That is, we have Matter at rest and Matter in motion. The difference is that force acts upon the latter, but not upon the former; and this acting force we can not think as a quality of the moving Matter, because it is drawn off or transferred from some other Matter and applied in the production of the motion. So far, then, as we know Force and Matter, they are distinct and unlike entities; and there is nothing gained by assigning to diverse objects the same name. The remark of the DUKE OF ARGYLL is very apt: "The real unities of Nature will never be reached by confounding her distinctions."

Then we have in our experience what we call system, plan, purpose, intelligence, will, desire, motive, and many similar modes or results of action; all of which we are in the habit of explaining by assigning them as the products of a something we call *Mind*. They are never exhibited by Matter unless it be in that peculiar form called *living* Matter; and the very contention here is, whether this form of Matter shows forth an attribute latent everywhere else through all the eternities; or whether another and foreign principle, Mind, here comes into this form or mode of Matter, causing all the phenomena of Life and Thought? The more reasonable conclusion would

seem to be that we should not consider that an attribute or mode of Matter which is utterly unlike and diverse from every other quality of Matter, and found only in one of its peculiar and limited conditions.

DYNAMISM.

Dynamists conclude that Force is the one essential existence, and Matter but a peculiar aspect or particular presentation of Force to the Mind. They argue that, "It is the essence of Force to produce or resist pressure ; but all we know of Matter is that it resists pressure, thus exhibiting one of the necessary characteristics of Force ; therefore, we must assume that Matter is a particular mode of that existence, one of whose essential principles is its only manner of presentation."

And this answer may be made to the Dynamists also. So far as we know, Force is diverse from both Matter and Mind. If Matter and Mind be but forms of Force, the forms are taken on so much beneath the horizon of any conscious view we can obtain that we can never demonstrate it, nor even have anything more than conjecture upon which to base the theory. But there can be no philosophical profit in accepting a theory, which, so far from being demonstrable, is not even in accordance with our ordinary and practical beliefs. While we cannot know certainly that the Dynamists are wrong, we do have to do violence to our usual form and trend of thought to believe them right.

MECHANISM.

Mechanists hold that Matter is the only form of existence ; that there is no Force ; that what seems such is only the necessary succession of phenomena in an endless system of Mechanism. They contend that Nature is a great machine running on unerringly, without beginning and without end, in which all we

know of Force or Cause is the occurrence of phenomena in necessary order and relations both as regards space and time. Any phenomenon is but a resultant of what preceded it, and that of what was still before ; so all we can know of *Cause* or *Force* is simply a resulting concatenation of phenomena compelled by the unvarying character of the laws governing it. Law is supreme. Law is unchangeable. And therefore phenomenon is the child or outcome of Law and not of Force at all. The great machine being once in motion requires nothing aside from Law to keep it going.

Mechanism like Nihilism contradicts the laws of the human understanding. For all movements of Matter in space we do always and necessarily think a *Cause*, *Force*. We cannot stop with the conception of the mere movement ; we cannot stop with the conception of a mere connected *causeless chain of successive motions*. On the contrary we do necessarily think of *something* which *forges* the chain, which *welds* the links, which *compels* each link to fall into place and follow the preceding link. And we practically shape our whole lives on this law of thought. It is only in metaphysical disquisitions that the contrary hypothesis is admissible at all. A certain school of scientists have tried to underpin the whole vast fabric of modern physics with this theory, but they have never made a single discovery, they cannot make a single experiment except on the assumptions of the contrary doctrine.

IDEALISM.

Idealists believe that the objective world is a projection or phase of Deity, that though real, though an existing entity, it is nevertheless a mode or aspect of Deity, either impersonal and unintelligent, or personal and intelligent. This gives us two phases of Idealism identical with Impersonal Idealistic Pantheism, and Personal Idealistic Pantheism of the former scheme.

Practically the remarks under the head of Dynamism are applicable to Idealism. We cannot know that both Matter and Force are not simply projections or modes of a universal Mind, that the whole universe known to us, whether subjective or objective, is not a manifestation of Deity. All that we can say is that it is not practically so presented to our thought. Neither in any science, except metaphysics, nor yet in any practical aspect of life is such a doctrine ever accepted. On the contrary, life with its achievements would be impossible did we not act as though Matter is real, Force real, and Mind real.

And here it may be well to notice two phases of compulsion governing the laws of thought. One phase absolutely stultifies thought itself, is logical suicide. Such is doubting the reality of the Ego itself or of the presentations of the phases of consciousness, because even the act of doubting destroys the doubt and establishes the Ego's reality.

On the other hand, certain things may be possible in thought without mental suicide, but which the laws of thought, nevertheless, practically forbid us to think. Such is the doctrine of Idealism just discussed. There is no intellectual destruction in accepting it. We may reason it out metaphysically, and, perhaps, philosophically believe it, without logically violating any of the laws of thought. But, practically, we cannot accept it. We cannot regulate life by it. We have to discard it in all scientific researches. We cannot make it square with experience. In the closet we may believe it; but in the laboratory, in the field, in the workshop, in the counting-house, in the legislative hall, we do not and cannot.

PSYCHISM.

Psychists think that there is no real objective world of either Matter or Force; that all there is of existence is simply conscious subjective states of the Ego. They contend that we have and can have no

assurance that there is any objective world corresponding to the subjective states of consciousness ; that we are of necessity shut up within ourselves ; that we cannot break outside the pale of consciousness ; that the Ego and its modes are all we can ever come in contact with, all that we can ever know ; and, therefore, that the assumption of anything beyond is a brazen gratuity.

NIHILISM.

Nihilists, going further than this, hold that all notions of the Ego even, are only conscious subjective modes for which we have no right to infer realities ; that we have no more logical warrant for saying that we are conscious of the Ego than that we are conscious of colors or of anything else in objective nature. They say that what is true regarding our knowledge of the objective world is equally true of the subjective ; that all we know of the Ego is simply a consciousness of states or modes, of sensations or feelings, and we have no right to infer that there is anything else in existence than these states or modes, than sensations and feelings. “The assertion is correct, then, that the world consists of only our sensations The primary fact is not the I, the Ego, but the elements (sensations). The elements *constitute* the I.” PROF. ERNST MACH.

Considering first the Psychic theory, it may be readily granted that the elements of all mentality are subjective modes or phases of consciousness. Any sensation as of color or sound is physiologically but a nervous or cerebral impression, and mentally, but a subjective state or condition of which consciousness takes note. And equally so is it of any physical feeling, pain, or pleasure. And so also of any emotion or volition. In all these cases there is a nervous or cerebral excitation attended by a subjective state registered by consciousness. In practice we treat these subjective states as symbols, and annex subjective or objective interpretations to them. But we have

no means of going outside of ourselves, or beyond these subjective modes to ascertain whether our practical interpretations are correct, or indeed whether these subjective conditions are truly susceptible of interpretation at all ; that is, whether they have any corresponding and occasioning conditions at all, either objective or subjective. That is to say, absolute knowledge cannot go further, or deeper, or higher, than these conscious subjective modes. All outside of them is taken on inference alone.

But this does not necessarily carry with it the conclusion that such notion is *only* a subjective mode corresponding to such action. On the contrary, Consciousness here is the Ego recognizing the Ego in action, the Ego looking upon itself while doing, and this recognition is no less real because in the nature of the case it is not possible except when *in* action, and for the very good reason that recognition is itself the exercise of an activity involving cerebral action. The Ego has to use the cerebral apparatus in viewing itself, and in doing so, it necessarily projects itself as a subjective mode ; but this does not argue that it is *only* a mode ; that the instrument of obtaining the view is the view itself; any more than is the mirror the image formed on its face.

Then the Ego does directly recognize itself in all conscious mental modes and activities. There can be no doubt about it, and DESCARTES was right : *Cogito ergo sum*, I think therefore I am. And this argument of DESCARTES is irrefragable, notwithstanding KANT's and HAMILTON's adverse strictures. It is *the* proof of self-existence, for the Ego never thinks without recognizing itself, and self-recognition is not only the highest but the *only* proof possible in the case.

And see where the contrary view leads : a consciousness of desiring, with *no one* to do the desiring, and *no one* to be conscious of it ; a consciousness of knowing, with *no one* to do the knowing, and *no one* to be conscious of the knowledge ; a consciousness of

loving, with *none* to do the loving, and *none* to be aware of the conscious state; a *consciousness* of willing, with *no one* to will, and *no one* to be conscious of the act of willing!

This seems like child's prattle. It is *Nihilism*. It is self-immolation. It is committing intellectual suicide preparatory to erecting a philosophical and metaphysical monument on one's own tomb. It is saying that mind is but zero, the soul = 0; but declaring the world is not, matter is not, mind is not, I am not, Deity is not, existence is not, there is nothing in time or space but a single congeries of subjective states of zero, with only zero for a consciousness denoting them.

The difficulty involves the infinite, demands that the Ego shall look into its own deepest recesses and see and comprehend the very essence of its own existence, and the initiatory springs of its own action. The very demand is incomprehensible to our understanding, as much so as it would be to apprehend how the eye could look in on the image on its own retina and follow the nervous excitation to the brain. It is a feat to which, so far as we know, only infinite wisdom is adequate. At least the mind of man has not attained to it.

But assuming, as we must, the establishment of the proposition that the Ego directly apprehends itself in all mental acting as DESCARTES taught, we go back to the concession that these acts of mentality are physiological and cerebral excitations discerned by Consciousness as subjective states, and the question recurs: What warrant have we for saying they are *anything more* than subjective modes of the Ego based upon cerebral action? that they have any external corresponding terms? that they have real objective reciprocals? that they truly represent anything in the outward world? or if they do, that the symbolization is in any degree accurate and reliable? And how are we to verify the correspondence?

At first impression this does indeed seem a hopeless inquiry; for, by the conceded theory, the Ego can never go beyond these cerebral excitations, never get beyond brain tremors, never come into actual contact with external nature. It is shut up with nervous and cerebral organisms and can never reach beyond their movements and processes. Then how can it know that excitations have objective anti-types and what these anti-types are like? How can it find the interpretation and verification of these cerebral symbols?

There are two answers. One is short, in one word—*experience*; but the explanation is tedious. A single excitation, as a single sensation first experienced is a very uncertain symbol, indeed it may almost be said to be no intelligible symbol at all; but by noting the character, succession, order, regularity and variations of these excitations, the facts symbolized are distinguished, and by many comparisons their reliability is verified. Many experiences of the sensations of touch and color have indicated and established the fact that certain of these sensations or subjective modes invariably find their correspondences in certain assumed or projected objectivities, which the Ego views as modes of an objective world, as forms of matter, force, and motion, and as occupying space and time. Practical use is made of these assumptions; thought, and action, and life are regulated by them; and so correct are they found, that great plans and enterprises are formulated upon them, and usually carried out with success proportional to the care with which the assumptions are made.

And not only does one Ego, but innumerable Egos, make these assumptions, usually very nearly alike, their likenesses supporting each other and their differences upon comparison correcting each other. And when an interpretation is found defective, the Ego corrects its bearings and makes new alignments.

It is this principle which makes human life practicable or even possible at all. Were it true, as the Nihilists and Psychists teach, that the Ego cannot reliably know anything of the objective world at all, life would be a much greater enigma than it is; for we should have a world of humanity regulating all their affairs upon bases, lines, and considerations, that none could know, or, logically, even say or believe were true. Otherwise the Philosopher uses symbols of pen and ink, and paper and press, which represent nothing real, in convincing unreal readers of the unreality of all existence.

Therefore, on presumptions of the precise strength of those upon which all men regulate their lives, their pleasures, and their business affairs, of the precise logical significance of every mathematical, physical, and sociological argument which they advance, we assume that there is something in the objective world answering to the subjective modes, called severally, sensations of matter, and force. Hence we assume that there is no logical basis for either Nihilism or Psychism.

But there is another argument of still greater force. The mind is so constituted that it is *compelled* to think the objective world as well as the subjective. It cannot avoid it if it would. Any suggestions to the contrary are but theoretical by-play. They are not and cannot be earnest arguments or practical opinions. When we abandon the laws of thought we abandon all the processes of reason, and this we do when we accept either Psychism or Nihilism.

DUALISM.

Finding then, that, practically at least, we have to deny *Monism* and accept at least two essential principles of being, let us notice, briefly, the different phases of *Dualism*.

Materialistic Dynamism says the two bottom principles are Force and Matter, that there is no

third principle, no Mind in existence. It holds that the universe is run by Force necessarily acting under inevitable and eternal laws inherent in its very essence and without the control of any higher directive principle. This is essentially the same as the category of causal Atheism under the former classification. It is Persistence of Force.

Idealistic Dynamism holds that matter has no real existence, that Mind and Force are the two essential principles. It makes Matter only a projection of Force. It is equivalent to Dynamic Pantheism, or to the Dynamic division of Monism with the second existence, Mind, added.

Idealistic Materialism, claims that the essential principles are Mind and Matter, and that Force is either an attribute of Matter, or production or projection of Mind, but that whether one or the other, it is not in essence a third principle. The first corresponds to *Materialistic*, and the second to *Dynamic Pantheism*.

TRINALISM.

Trinalism gives us three essential principles, Mind, Force, and Matter. The opposing doctrines have been so fully discussed that it is not necessary that we devote space to this, further than to emphasize the proposition that whatever the peculiar philosophical, metaphysical or doctrinal opinions we may severally entertain, this is the practical, every-day, "common-sense" belief of all the world. On this belief the world is run ; civilization is controlled by it in all its aspects whether in economics, politics, ethics, socials, science, or religion. Absolutely, it may or may not be true ; practically, we do believe it, and must accept and abide by it.

CHAPTER IV.

CONSCIOUSNESS.

CONSCIOUSNESS as ordinarily understood is a mirror in which the Mind sees not only objective nature but its own subjective activities. What is the mirror? It is sometimes called states of Consciousness. This can scarcely be correct for while *in* Consciousness, it is *not* Consciousness. It is more correct to call it a presentation *to* Consciousness of objective and subjective phenomena, one or both, in consecutive impressions or outlines. The cognition of these impressions is *knowing*; each particular cognition is a thought or idea, and we can only know that we know by such acts of cognition; by sensibly taking in and appropriating such impressions. The presentation of these impressions, then, constitutes the mirror held up to Mind in order that it may there behold, glassed, the phenomena of existence and action, in the form of ideas or concepts, both subjective and objective. But this implies a double process with two actors. On the one side is the presentation, the mirroring of phenomena, with a necessary inference of a *something*, cause, actor, in the background, setting forth the presentation; on the other side is the act of cognition, of reading off the presentation, with another *something*, cause, or actor in the foreground doing the recognizing. Then we have four elements in every act of Consciousness; the *activity* making the presentation, the *presentation* itself, the act of *cognition*, and the *activity* making the cognizance. Of these elements, recognizing the mirrored presentation is one of the supreme acts or essentials of conscious intelligence, to which making the presentation is subsidiary.

SENSATION.

But what is that element which makes the presentation? How and where does it get the material? and how fashions it into presentable phenomena? To answer this we must go back a ways. We see a rose. Sunlight falling upon it is partly analyzed and sifted; some of the reflected rays pass through a lens in the eye and falling upon the sensitive surface of the retina sets up certain vibratory motions in the fibres of the optic nerve which terminate there; these motions, or some effects from them, are carried to certain parts of the brain, setting up corresponding motions there, and then the presenting element or factor does what? Carries these vibrations from the brain and traces them on the mirror of Consciousness? No, not that. The vibrations cannot rise higher. They must end in the brain, for being *only motions* of particles of matter they must end where Matter ends. They cannot transcend the order of their existence.

PROF. JOSEPH LECONTE says: "Suppose, then, we expose the brain of living man in a state of intense activity. Suppose, further, that our senses were absolutely perfect, so that we could see every change, of whatever sort, taking place in the brain substance. What would we see? Obviously nothing but molecular changes, physical and chemical; for to the outside observer there is absolutely nothing else there to see. But the subject sees nothing of all this. His experiences are of a different order, viz., consciousness, thought, emotion, etc. Viewed from the *outside*, there is—there can be nothing but motions; viewed from the *inside*, nothing but thought, etc." (*Evolution and Religion*, p. 292.) PROF. CLIFFORD is to the same effect; and PROF. FISKE says: "It is utterly impossible that actions in the nervous system should ever, under any circumstances, stand in the relation of cause to psychical actions going on in the mind. A wave of molecular motion in the brain

cannot produce a feeling or a state of consciousness. It can do nothing whatever but set up other waves of molecular motion, either in the gray matter of the ganglia or in the white matter of nerve-fibres. Whatever goes in any way into the organism as physical force must come out again as physical force, and every phase of every transformation that it may undergo in the meantime must be rigorously accounted for in terms of physical force, or else the law of the conservation of energy will not be satisfied. To introduce consciousness or feeling anywhere in the series, as either caused by or causing actions in the brain or nerves, is not to state what is untrue, but is to 'talk nonsense,' as CLIFFORD would say." (*Excursions of an Evolutionist*, p. 332).

What then? The presentation element simply interprets this molecular brain motion into phenomenal presentations on the mirror of Consciousness, simply takes hold of the language of quivering brain molecules, carries it across the chasm separating Matter and Mind, Motion and Consciousness, and transcribes it in a different and higher order of language on the glass of the soul. This is the other supreme act in the process of *knowing*. But how is the process accomplished? We do not know. There is the molecular brain action on that side, here the corresponding interpretation mirrored on this; the formula by which transformation and transfiguration is carried out we do not know; we cannot see it; we cannot follow it. The beginning and the end we know, the intervening middle is utterly beyond our comprehension. We do not know the *actor*, the *interpreter*, except by implication; we see the beginning and the end of a process; we necessarily infer a cause, necessarily think *something* does it; and from the invariable dependence of the conscious Mind upon, and connection with it, we infer that it is an element or faculty of Mind.

But although the supreme crisis of the inter-

pretation of the phenomena of motion into the phenomena of thought is hidden beyond our utmost analysis there is much on either side to enlist our attention. It may be noticed first that the very supreme act of carrying the voice of molecular motion through the night, and across the gulf, and picturing it in the colors of light on the mirror of Consciousness, is accomplished by the production of *other* molecular brain motion. The brain is used as an instrument in translating its own molecular quiverings into the language of Consciousness. Physiology and Pathology are full of demonstrations of this proposition. Aye, more than that, when we get to it. The Mind is utterly incapable of any conscious act whatever, except as a concomitant of molecular brain action, except as it uses the brain as a tool in its accomplishment; or, as the Materialist has it, except as a resultant of molecular motions and processes; of which, more anon. Another thing here deserving attention is, that *not all* that is carried by interpretation across the gulf is delivered to conscious intelligence, as is evidenced by the familiar phenomena of somnambulism and *double-consciousness*. However, there is another possible explanation here, which needs to be well considered. It is possible that the supreme cognizing element of conscious Mind is itself a double element, one side of which simply *observes* while the other *accounts itself to itself*.

The process reaching up to and including molecular brain action, calls for attention next; and that we may avoid complications in the first instance, the sense of Taste will be used in illustrating the subject. When a sapid substance, as a lump of sugar, is brought in contact with the nerves of taste in the tongue, the fact or *a fact* is communicated through the nerves to the brain setting up vibratory motion in certain points there. Now, there is no room here for "liberated energy" to travel along the nerves to the brain as may be insisted upon in the case of vision. Here, at least, the process must be some

other ; there must be some other power active than a force flowing out of the sugar. But if not from the sugar, what origin has it ? There is only one other source to assign it to. It must be a power, a faculty of the organism itself ; and the harmony of its action with other mental powers shows that it must be regarded as another element of Mind. That is, one mode or faculty of Mind carries an impression of the peculiar effect on the nerves of taste when brought into contact with sugar, to the brain, and there causes certain molecular motions, corresponding, or correlated, in some unknown way, to the effects of the contact. And this is Sensation.

Let us now follow the process clear through. First we have a contact between the extremity of the nerves and the sugar, that is taken up by the first mental faculty (which may be called Sensory), carried to, and written upon the brain in molecular motion. Then the second faculty (which may be called the Intuitional), takes it up, and in interpretation, carries it across the gulf into the realm of thought, and writes it upon the tablets of Consciousness. Then the highest faculty of all, the Ideal, reads it off as ideas, conscious knowledge. And these three faculties, all working in harmony, are but different elements of one personal entity, the Mind, the Ego.

Smell and Touch are like Taste in that the sensations begin with contact between the extremities of the nerves of the respective senses and material substances. Sight and Hearing are something different, since the origin of these senses is in the contact between the extremities of nerves and vibrating mediums. But we may suppose the impressions are carried to the brain by the same faculty and in the same manner. Physical pain and pleasure are different yet, in being simple states of the organism communicated to the brain, by the same faculty, as may be supposed.

Now let us examine what information the several

senses are fitted to gather up and transmit. And first, touch. In what way are the nerves of touch affected by contact with objects? They are met by resistance, giving the sensations of hardness and softness, of rest and motion; by gravity, giving the sensation of weight; and by temperature, giving the sensations of heat and cold. What other can touch tell us? What else do our hands feel? Nothing, I think.

Next, as to vision. Here is only contact with ether, vibrating at different rates of speed, thus giving different sensations of color; each different measure of speed, and length of vibrating wave, having its own color. Nothing else than these vibrations can vision give us. Nothing else do we *see*.

Sound is atmospheric vibrations, nothing more. All we hear is the motions of the air.

Taste and smell are both senses of touch, one only gives us a quality of matter called flavor, the other only a quality called odor. This is all they can do.

Physical pain and pleasure, at most, give us notice of certain abnormal or exhilarating states of the physical organism.

This is the circle of the sensations with all they give to be carried to the brain. The motions set up there in correlation to these sensations cannot in significance transcend them, cannot be interpreted across the way to mean more. If we have other elements of thought we must look to some other source than sensations for them.

UNCONSCIOUS INTELLIGENCE.

- * Another subject of profound significance now bars our way. HARTMANN, twenty years ago, announced the proposition of an *unconscious intelligence* in animal life, but the doctrine has not taken much hold on philosophical thought, partly, perhaps, because he pressed it too far, and partly, because he was in advance of his age.

It is aside from the argument in hand to consider whether the phenomena referred to by HARTMANN are "unconscious absolutely and in themselves;" or whether they may be framed in a by-consciousness of their own, distinct from the intelligible Consciousness of the mind, but closely related thereto. Enough for our present purpose that "HARTMANN was able to cite facts of intelligence which are outside of the consciousness of the *me*."

However, before insisting that the animal life exhibits the semblance of *intelligence* in every part and in the whole, it may be well to inquire what *intelligence* is. And first we may observe that it is the capacity of either evolving or compelling certain kinds of processes, or else of recognizing the results of such evolution or compulsion; either the capacity for a certain kind of doing, or of recognizing the results of such doing. What, then, is the kind of process or doing in which the element of intelligence inheres? It is the resultant action of co-ordinated forces, where several forces or processes are adjusted or brought together in producing some utilitarian end. With this definition, no one can doubt for a moment that not only is the animal body an intelligent result as a whole, but that it is made up of intelligently adjusted organisms, each of which is, itself, an intelligent result; not only is it a continuing intelligent process, but an adjustment of minor continuing intelligent processes. And it is this phase of intelligence with which we are now concerned; the adjustment of forces into the resultants of life-processes.

Of this there are but two possible views: either they occur of necessity without intelligent direction, or else as the results of intelligent oversight and control. This brings us back to the great ontological distinction between Necessity and Purpose. The former assumes that all life-processes are resultants of groups of forces, correlated by reason of constitutional necessity, otherwise called *laws*, co-eternal with their very existence. Each phase of such correlation

is a necessary outgrowth of some former phase, and that of some still earlier phase, and so on back to the beginning. There is no plan about it, no purpose about it, no will about it; nevertheless, it is *all just as though it were planned* by will and purpose. Though not designed it bears the semblance of design. And of course it obviates all need or place for an intelligent, directive principle. Each living organism is simply a machine run by a circle or congeries of forces, concentered upon it by reason of necessary and eternal laws.

The other theory holds that there is in each living being, an intelligent, directive principle, sometimes called Life, sometimes Nature, and sometimes Vitality, which co-ordinates, adjusts, and controls all the forces concerned in life processes towards the attainment of certain purposed ends. It is the necessary alternative of the former theory, against the validity of which arise, in protest, all the arguments heretofore urged against a mechanical scheme of iron destiny for Nature. It will be assumed, therefore, that the intelligence mirrored in the human physical system, is not a semblance only; that its processes are not intelligent in appearance only, but in reality; that there is a Life-principle within, which intelligently builds up all the organs and carries on all the processes of life. This includes nerve and brain, which are built up, continually repaired, and operated by such intelligent principle. And yet every process, from the minutest up, is carried on through the instrumentality of the brain. Even the brain itself is built and kept in repair by the use of itself.

VITALITY.

This gives us a fourth element of mentality which is, as we shall find, intimately connected and blended with the others. It has been remarked that physical pains and pleasures are in the nature of sensations, written on the brain in molecular movements, and

interpreted across on to the mirror of Consciousness. The same is true of such physical conditions as languor, fatigue, sleepiness, hunger, thirst, etc. They are carried to the brain by this fourth element, the unconscious principle, the life principle, *Life* or *Vitality* we may call it for brevity, and written there in tremors and vibrations; or, it is possible, as it may be with all other sensations, in permanent allocation and arrangement of brain molecules; and then interpreted across. It is the business of this class of sensations to certify to Consciousness the states and conditions of the organic system which demand pre-vision from conscious intelligence in keeping the wheels and processes of life in smooth running order.

A PRIORI IDEAS.

This prepares for the consideration of one of the most profound as well as most discussed of all the problems of metaphysics. Whence the origin of such ideas as space, time, cause, number, etc.? Some philosophers as LOCKE, HOBBES, and CONDILLAC make them sensational wholly. They say they come in with touch, sight, and sound. But it seems that the chief basis for this assumption has been the inability of finding any other satisfactory origin; for, evidently, it cannot be contended that we *see* space, or time, or cause, or anything else, for that matter, than the pulsations of differently lengthened and timed waves of ether; or that we *touch* them, or anything else than resistance, movement, weight and temperature; or that we *hear* them, or anything else than atmospheric vibrations. If such ideas are *sensational* at all, they evidently must be taken in by the sense-process after the contact between the nerve extremities and the objective existence, and before the molecular brain motion is interpreted across the way.

The alternate hypothesis is that these ideas are innate, intuitive, or *a priori*; that they are not given by the senses, but arise in the mind concomitantly

with sensations, by reason of some necessary law. And this seems to be the true theory. For, as sense in and of itself can give us nothing larger, nothing more, and nothing different, from what is contained in the simple contact of the nerve-extremities with matter, either static or undulatory, it would seem that these ideas must be found somewhere along the line between such contact and the casting of their shadow upon the glass of Consciousness. In the present state of psychological analysis it is difficult to say just where or how this is done. But as we have seen, *Life* runs and directs all organic processes through the instrumentality of brain and nerve, even to the continuous building up, tearing down, and repairing of these structures themselves. In the molecular sense-movements in the brain, there must be an exceedingly intimate correlation and blending of the two mental elements heretofore referred to as the Sensory and *Life*. Indeed, we have just seen that such bodily conditions as hunger and sleepiness, are written on the brain by *Life* in the same manner that vision is by Sensation. It even seems highly probable that in a last analysis, it will be found that there is no real distinction between the elements, and that the whole process of sensation is produced by the one factor, *Life*, the unconscious side of the soul. Hence, the probability is, that when Sensation writes sound, or resistance, or color, in cerebral vibrations, *Life* writes alongside of it, or interwoven with it, some mode of space, or time, or cause, or number, or some other abstract notion, or notions as the case may be, and that together they are interpreted over the way.

But whatever element originates them, or at whatever point originated, they seem to arise invariably in a certain order of correlated concomitance, or sequence to sensation, giving connection, form, and consistency to thought. Thus in company with certain sensations, certain ideas of space, direction, distance, size, or form, arise and will not down; in

company with certain others the idea of duration ; in company with others the idea of Cause, the *doer* of something; and so on. Without these connecting ideas, Sensation would give us only detached mental points or blotches, and Consciousness would be a mirror speckled over with points of color, resistance, sound, etc., without form, consistency, coherence, or meaning.

But a still more profound inquiry presents itself here. Are these *a priori* ideas which thus form a connecting web for the units of sensation manufactured in the Mind, or found ready furnished to its hand ? If the latter how ? where ? and when ?

Their invariable consistency with themselves, their absolute certainty and parallelism, so to speak, with like sensational accompaniments, would seem to negative the former inquiry. If simply molded by some mental element to fit particular sensations as they arise, it is not seen how they could possess the invariable consistency and certitude that we know they do. If, for instance, *Life* manufactures the notion of *Cause* to fit the sensation of some movement, how does it happen that never in any instance does she neglect the duty, or present the cause with less or greater adequacy than what is just sufficient to produce the particular effect ? Why does she never in any instance manufacture the notion that twice two are five, or that a half is equal to a whole ? In discussing Space it has already been shown how it is literally packed with an infinite series of infinitudes of *facts* in the modes of shape, form, figure, size, etc.

Then, what ? The conclusion would seem to be that Mind finds these elements of thought ready formed, and has but to apply them to the raw sensations as they arise. Finds them where ? As a part of the armory of her own existence, supplied from the infinite ocean of truths which constitute the fact and form of all existence. The class of notions we are discussing seems to be immutable truths that would be just what they are were there no Mind,

finite or infinite, in existence to contemplate them. Certainly we cannot annihilate them in thought nor conceive of the possibility of such thing. To us that twice two are four, or that an effect is the result of a cause, are and must be absolutely true, independent of all other being. In space, the possibilities of form shape, size, direction, and distance, are, as we have seen, all infinite in number yet absolutely true in fact; so with number, duration, cause, etc.; so that, with or without Mind, finite or infinite, there are an indefinite number of infinite series of truths absolutely necessary, and absolutely crowding the possibilities of all space and time. In such a universe of infinite truths absolutely full and packed, all Mind, whether finite or infinite, must exist, must have its being. Are such truths subject to manufacture? Are they made? Certainly not. They exist independent of all making, of all power. Mind of whatever grade cannot dominate them, must co-ordinate with them, live among them, and in accord with them; but never annihilating, modifying, or controlling them. It can only use them by aligning itself with them, subordinating itself to them.

Then, what? Why, when Sensation presents her contactual facts, *Life* complements them with a presentation of the appropriate truths, gathered from the eternal ocean of truths, on the bosom of which she floats; and, together, they come to be mirrored in Consciousness as a consistent whole. In this way, ideas or thoughts are planted in the conscious mind, always consisting of two elements or parts, the Sensational and *a priori*. They may be called Formal Ideas.

DR. PAUL CARUS in "*Open Court*," (Sept. 11, 1890), presents a very clear, and in the main, correct statement of the relations of the two elements of thought, sensational and *a priori* or formal. He says:

"LOCKE's theory is generally, and perhaps rightly, considered as sensationalism. He proceeds from the

rule that nothing is in the mind which was not before in the senses. Sense-impressions are the origin and beginning of all knowledge. LOCKE says:

“ Whence hath the mind all the materials of reason and knowledge ? To this I answer in one word from experience ; in that all our knowledge is founded and from that ultimately derives itself. Our observation employed either about external sensible objects, or about the internal operations of our minds, perceived and reflected by ourselves, is that which supplies our understanding with all the materials of thinking.”

“ It appears that KANT in the most essential point agrees with LOCKE. The very first sentence in his “ *Critique of Pure Reason* ” declares :

“ That all our knowledge begins with experience there can be no doubt. For how is it possible that the faculty of cognition should be awakened into exercise otherwise than by means of objects which affect our senses ? ”

“ KANT made a distinction between experience and pure reason. He confined experience to sensation and placed it in opposition to that which Locke calls reflection. KANT says : ‘ Although all our knowledge begins with experience (i. e. sensation), it by no means follows that all arises out of experience (i. e. sensation.) ’ KANT then arrives at the conclusion that there is some knowledge altogether independent of all sensory impressions. ‘ Knowledge of this kind,’ he says, ‘ is called *a priori*, in contradistinction to empirical knowledge, which has its sources *a posteriori*, that is, in experience (sensation). ’ ”

“ Knowledge *a priori* is a learned expression for that which we would prefer to call ‘ formal thought.’ Knowledge *a priori*, said KANT, is the condition of all experience, for there can be no sensation without the forms of understanding. In other words, sense-impressions by themselves are meaningless ; they have to be interpreted in order to be conceived as sensations. A sensation is a sense-impression felt to be

and interpreted as the effect of some external object. But in order to achieve this mental act of changing a sense-impression into a sensation a sentient creature wants something of that faculty—be it in ever so rudimentary a state—which is called understanding.

“JOHN STUART MILL did not see the difficulty of the situation. He based all experience upon the principle of causation, and when he was required to give an account of the principle of causation, he declared that it was derived from experience. This is called a vicious circle.

“SCHOPENHAUER was aware of the fact that the principle of causality is the condition of all experience. ‘We do not see with our eyes,’ he said, ‘but with our understanding.’

“Formal thought not only aids us in the classification of the data of experience; it also assists in the amplification of knowledge. It is this wonderful quality which makes formal thought so valuable. . . . We know that twice two are four and will be four as long as cognition lasts and even longer. A reversion of the formal laws is inconceivable. They are irrefragable. . . .

“LOCKE did not recognize the all-importance of the formal element in experience—for pure reason is nothing but a system of the formal element of experience.

“Pure reason, or the mental function of formal thought does not stand in opposition and still less in contradiction to experience. It has grown from experience and is an integral part of experience in the sense defined above. For we understand by pure reason agreement with the formal laws of existence. The forms of things, the relations among them are also data of experience; they are not shaped by us with arbitrary liberty, they are given to us by experience. We own them in our minds as the forms of our thoughts; we have abstracted the laws of formal thought by reflection and introspection. The formal element was imported into our minds together

with the sense-impressions. We do not deny that mere isolated sense-impressions cannot generate knowledge ; and we must not look for the source of pure reason in the sense element of the sense-impressions, but in the formal and relational element, which is imparted to sentient beings through a constant repetition of sense-impressions of various forms. The formal accordingly is ultimately derived not from sensory sources, but nevertheless from experience. It has been gained by abstraction."

And PROF. BADEN POWELL says : " If the laws of reason did not exist in Nature we should vainly attempt to force them upon her : if the laws of Nature did not exist in our reason we should not be able to comprehend them."

MEMORY.

Two other very closely allied processes may be noticed here : Association and Memory. Association is a process in which one Formal Idea, or group of such, is followed in sequence by another, in some way correlated to it as though suggested by it. Memory is where one Formal Idea, or group of such, is repeated or recalled to consciousness. It will be observed that Association must be a kind of Memory since it is possible only by recalling former Ideas or groups of Ideas. Two things deserve notice here. One is that these processes are like all other mental processes in that they involve cerebral action, and the other that they go on under a suspension of conscious will power, as in somnambulism and dreaming. These facts seem to argue that they have their origin on the nether side of the gulf and are interpreted across ; that is, that some faculty on the Sensational side originates and writes them in the molecular motions of the brain from which they are transferred and transposed into thoughts in Consciousness.

We may suppose this faculty is what we have called *Life*, but one of the most profound of all

difficulties presses upon us here : How is the prior thought retained so as to be reproducible in Association or Memory ? It has been supposed that when a thought originally sweeps across, or through the brain, it causes its molecules to assume a fixed static relation to each other which acts as an index to the particular thought ; and when the Mind repeats its sweep as before, it finds such index fixed, and reads it off ; something as a blind man reads off his alphabet as often as he runs his fingers over it. It seems difficult to accept this explanation on account of the great instability of the cerebral substance. It does not seem possible that each original idea can leave a fixed and definite static condition in a material so unstable and subject to continual change. Another explanation offered is that each original idea is produced by, or produces a particular molecular vibration in some part of the brain and that the vibratory movements of the same molecules will cause a recurrence of the idea. And it is claimed that the measure of force or potency which caused the first vibratory movement, will tend to cause its repetition, and indeed, that with each repetition of the vibratory motion by any force liberated in the same manner and direction, the tendency to a precise repetition of the undulation, with the accompanying idea, will be still greater. But there seems a physical objection to this hypothesis also, in this, that it is not seen how, in the unstable and continually changing condition of brain-substance, the same molecules should ever occupy the same relative spatial positions after any vibratory movement as before ; and yet, if they do not occupy precisely the same relative positions, it is not seen how they can be made to repeat the same precise vibratory movement.

PROF. BAIN supposes a brain cell and fibre appropriated for the use and production of each thought and feeling, each "mental acquisition" he calls it, and that the tremor of the same cell or fibre always produces the same mental state. And so numerous

are the cells and fibres that he calculates as follows : " With a total of 200,000 acquisitions of the assumed types, which would certainly include the most retentive and the most richly-endowed minds, there would be for each nervous grouping 5,000 cells and 25,000 fibres." (*Mind and Body*, p. 107.) But granting his theory it does not help us forward a single step, for the mystery remains : In memory what determines that one and not another of these cells and fibres shall be thrown into tremors ?

A more severe analysis will show that there are really two possible theories open to acceptance. The first is, that the repeated ideas are the results of repeated movements of brain molecules, caused by forces inherent in them, or supplied by the environment, independent of any direction or control of any vital or mind-principles. This is back to necessity. The second is that *Life* intelligently reproduces a cerebral or molecular movement, in such exact similitude to the prior one, that it is interpreted across into a repetition of the same thought. *Life* intelligently caused the prior vibration and *Life* intelligently produces the latter. And this it does in correlated sequences of occurrence according to dimly understood principles. This view makes the roots of Memory to rest back in *Life*, or the unconscious side of the Mind ; that is, Memory is a Mind-act realized through vibratory motions Mind-caused in brain-fibres or brain-cells.

ATTENTION.

But we turn now to a process or faculty on the conscious side of Mind—Attention ; a conscious power which the Mind has of recalling in Memory, ideas or series of ideas. This is an *effort* of which every one is, or may be conscious ; and, therefore, a phenomenon of the hither side of the chasm ; but whose effect, or mandate reaches back to the nether side ; for even this conscious effort can realize itself

only through the use of cerebral organs ; it has to go over there to find the instrument by the use of which the molecular movements are repeated in order to the reproduction of thought in Memory. And not only does Attention stir the brain across the way in the phenomena of Memory, but it sends the blood into the cheeks, or from the cheeks as thoughts provocative of shame, or fear, are thereby recalled. But does the conscious Mind do this directly through Attention, or any other faculty ? It seems not, that it does not act directly on the brain molecules at all ; but that it directs and commands *Life* to so act, and is obeyed.

FEELING.

We will next consider an altogether different order of mental phenomena. Certain sensational processes as fatigue, hunger, thirst, etc., are translated into something more than mere points of knowledge, elements of thought. They are mirrored not only as ideas, but *feelings*. Mind not only thinks, but *feels*, or is affected towards them. The Interpreting faculty, in lifting them across the gulf, gives them a double office and significance. Of course, this double significance was written on the brain in molecular motion by *Life*. Do we find all feeling and emotion here ? I think so. Certainly none of it is possible without molecular cerebral action. Certainly it all has to be interpreted over into Consciousness. The Cognitive element does no more than recognize these affections as a class of thoughts, as a grade of elemental points of knowledge. It does not originate or control them. It finds them brought over from the other side and mirrored in Consciousness.

BEAUTY AND DEFORMITY.

But near of kin to this process is another of vast moment. The sense of beauty or ugliness, including

rhythm and harmony or discord in sound, seems to have the same basis and origin. They are interpretations brought over from the nether side and glassed in Consciousness for the cognition element to observe. Over there they are written in tremors on the brain, supposably by *Life*. How and why? Beauty of shape arises from conformity of outline to certain mathematical orders of regularity of occurrence in points of position, and therefore of lines connecting them, while homeliness of shape is precisely the contrary; so that both Beauty and Deformity have their bases in the eternal Laws of Space. *Life* recognizing the grouping of these laws, one way or the other, in any particular instance, writes the recognition in cerebral vibrations and it is interpreted over. So of the agreeable or disagreeable in color. As each color arises from its own particular frequency and length of wave undulations, in every instance there is a presentation of conformity to some aspect of the mathematical truths of space, time, and number, of either greater or less regularity and harmonious blending. In each case *Life*, or the Sense of Vision, possibly we should say, recognizes this degree of harmony, writes it in brain tremors along with the sensation of color itself, and together they are translated across into Consciousness. And so music is the recognition of certain harmonic regularities in atmospheric vibrations according to like eternal laws of space, time, and number.

REASON.

We come now to investigate a yet nobler faculty, Reason. What is it, its source, its processes, its validity? In association of several ideas into one there always arises a sense of harmony or discord; a sense which comes over with the blended or compounded idea. The cognition of such harmony or discord is the root of reason. Then the cognitive faculty has no office to perform in reasoning but to take note of

the deliverances of the interpreting faculty as painted on the walls of Consciousness ? Wait and see. Whenever simple ideas are grouped, or groups of ideas regrouped in association, this feeling of the harmonious or discordant comes over with them, without a doubt, and is noted by the reasoning faculty. But to get down a little closer, there are always certain facts, certain mirrored images, hung in the gallery of Consciousness which we have already accepted as realities ; certain *standards of the true*. When the sense of harmony comes over with the association of a new idea or group of ideas with a *standard* group or picture, the noting of such harmony gives us the notion of the true ; when the feeling of discord comes over, we note it as untrue. That is, we recognize accordance with an accepted standard as marking the verity of the newly associated notion, and a like discordance as marking its falsity. This is the elemental process of reasoning. And still we are compelled to go back across the gulf to find its origin in cerebral vibrations caused by *Life*, presumably. And before we examine any higher phase of the subject, let us recall how the feelings have the same origin, not only those attendant upon appetites, natural or acquired, and other bodily conditions ; but a class of emotions of much greater scope and variety attendant upon general notions of things mirrored in Consciousness. Beauty attracts, deformity repels, order, harmony, and regularity are seductive, disorder and discord are repulsive. The one feeling or the other in various degrees of intensity, and under various names comes over with every thought. Every emotion has its origin in this process. And not only do such notions as immediately affect our individual personal conditions, such as those of family, health, comfort, friends, property, etc., to which *Life* writes down affections and emotions of one kind or another for us, to be sent over to the near side, but more general ideas, such as those of history, politics, ethics, science, phi-

losophy, etc. In these notions, as in all others, a critical analysis will always show that we have a bias one way or another, a *feeling* sent over and registered in Consciousness. And we shall find, almost invariably, that towards our accepted standards the feelings one way or the other are strong and pronounced. So that the feeling of the true or not-true, the roots of reason, arise as concomitants of associations of new ideas with *standard* notions, towards which we already entertain strongly attractive or repulsive affections, which cause the new feelings of harmony or discord to present themselves with marked prominence.

And is it the province of Reason to mark all this sense of harmony or discord, agreement or disagreement, sent over to this side; and call the one truth, and the other error? and nothing more? Let us see. It has already been shown that the cognitive faculty by a process called Attention may itself go back on the other side and call up ideas in association; that it may call upon *Life* for activity in going in this direction or that, into this channel or that, and writing in cerebral tremors the associated ideas, or rather, points of knowledge, or elements of ideas she finds in her search, to be interpreted over for the gaze of Reason. So this faculty may, in this way, test every standard she has adopted, go back, dig around it, order up all other standards, and see whether there be a general harmony or discord. So, when a particular association is made with any standard, she may call for other, and other associations without limit, till she finds whether a particular observed harmony or discord is general or special. So, while Reason cannot control either belief or feeling directly, it can test the one and control the other indirectly through the process just named. As between a particular standard and a particular associated idea, Reason is helpless to vary the sense of truth or feeling that may accompany it; but, she may go back and test the *standard*, and find other notions of the

true arising ; or, she may call up other associate ideas and thus vary the feeling.

A first word on the latter. One may have a standard of his own rights ; in associating with such standard ideas of wrong received, feelings of great bitterness, hatred, and probably of revenge, will likely come over with the association ; but, by calling up new association of plans for enjoying his rights, aside from and regardless of such injuries, he will find the ugly feelings shaken off. Thus, by intentionally changing the association of ideas, he may modify the attendant emotions.

As already observed, we invariably have some bias one way or another towards all associated groups of ideas and all accepted *standards* ; and nearly always, the affection is favorable towards what we have accepted as *standards* or canons of truth. We come to feel tenderly towards such, to dislike to have them displaced or superseded. Therefore, there is a general reluctance to testing our standard opinions. For instance, a man has a certain political faith, certain *standards* of political truth. Now any idea or group of ideas in harmony with such *standards* are accepted as true, necessarily ; ideas in discord with them are rejected as untrue. These are feelings sent over from the vibrating brain molecules and cannot be other than they are so long as the associated ideas are what they are. And further, having a liking or tender affection for his *standards*, it is with difficulty that he can be induced to re-examine them. This affection for *standards*, and habitual groupings of thought, is the basis of prejudice ; when the feeling is strong we say, he is "a man of strong prejudices ;" and such an one seldom changes his opinions, because of his reluctance to re-examine his canons of truth, or to abandon them, even when convinced of their erroneousness. Therefore it is that men are so strongly tied to their party, sect, or faction, and that they are such creatures of thought-habit.

WILL.

We reach now the supremely crucial point in intellectual processes. Through the use of the faculty called Attention, Mind does, or may, as we have seen, call up from over the deep, successive associated forms of thought, indefinitely, having one picture after another hung in the gallery of Consciousness; each one bearing with it a feeling, an element of emotion, of greater or less intensity. When the associate thought includes the notion of some relevancy to or bearing upon the condition of Self, either directly or remotely, the attendant emotion comes in some form of expectancy, hope, desire, dread, or fear, as the case may be. Each act of calling up a new association is a determining effort of Mind with the attendant emotion before it, and such emotion or feeling so presented, is what is known as *Motive*; it is what is presented as inducement to other and further Mind-determination. Finally, the moment is reached when Attention is not required to call for further associate thought, but with a last and perhaps stronger *motive* before it, a last determination is made, the hand shall or shall not be lifted, the sentence shall or shall not be written, and *it is or is not done*. This whole discussion has been to reach this interrogatory: In this final determination, is the act *necessitated or free?* Is the Mind *compelled* to act as it does, or is it *self-determined*. Here the whole issue of Necessity and Purposiveness comes back upon us; and, as we have seen all along, it cannot be both; it cannot be partly one and partly the other; it is and must be one or the other.

The arguments for Mind-necessity are two, principally. The first is that all mental processes are the result of, or at least correlated in necessary concomitance with molecular cerebral vibrations, and that these are the necessary resultants of forces, collocated and co-ordinated in the brain, by reason of laws eternally inherent in their constitution; so that each

thought is simply a necessary phase of a process of adjustment of forces, assembled in the brain ; not by any directive power, plan, or purpose, but because that in an eternity of successive actions somewhere in the regions of space, each necessarily growing out of the preceding, each of these forces finds itself, at that moment, in the brain, face to face with each of the others ; so that an adjustment and co-ordination must of necessity take place—the resultant of which is the particular thought. Meeting there and then, each by reason of an eternal path laid out for it in the law of its own essential existence at the very beginning of all things, a necessary grinding takes place between ; the result of that grinding is a thought or a feeling, perhaps a volition ; other forces meet in the same way, and others, and others ; and so we have successive thoughts and feelings, and acts of willing, of necessity just what they are. An exhaustive analysis would show many inconsistencies in this theory, but I will only refer to the argument heretofore made against Necessity. Will and purpose being excluded in the eternal dawning of existence, it just happened so that these forces were endowed with the particular inherent and necessary constitutional laws which have brought each of them along down a most sinuous path to the meeting in the same moment, in the same particle of brain substance. That the cast of the hazard should have been such, is as one to infinity ; that it should have been so for every thought, emotion, and volition, of every mind, is as one to infinity raised to an infinite power.

PROF. FISKE says : "Volitions are either caused or not caused. If they are caused the free-will doctrine is annihilated." (*Cosmic Phil.*, v. 2, p. 181.) This is true if by *cause* PROF. FISKE means, as he seems to, something extraneous to the inherent energies of Mind itself. For, as has been elsewhere noticed, he makes Chance the only alternative to Cause. "No middle ground can be taken. The denial of causation is the affirmative of Chance, and

between the theory of Law there can be no compromise, no borrowing and lending." (*Ibid* p. 187.) This is also true on the proper definition of Cause. But Law with him is above all control, all constraint.

"Either Law or Chance—these are the only alternatives, unless we were to have recourse, like the Mussulman, to Destiny, an illegitimate third idea, made up of the other two, misconceived and mutilated in order to fit together. But for the modern thinker there is no middle course. It is either symmetry or confusion, law or chance, and between the two antagonist conceptions there can be no compromise. If the law of causation is universal we must accept the theory of law. If it has ever, in any one instance, been violated, we may be excused for taking up with the theory of chance." (*Ibid*, p. 171.)

"Man lives and moves and has his being in strict conformity to law. * * * His very thoughts must chase each other along definite paths and contiguous channels marked out by the laws of association. * * * Throughout these various phenomena we know that neither at any time nor in any place is law interfered with,—that yesterday, to-day, and forever, the effect follows the cause with inevitable and inexorable certainty." (*Ibid*, p. 171.)

"Our will causes our bodily actions in the same sense (and in no other) in which cold causes ice or a spark causes an explosion of gunpowder." (*Ibid*, p. 159.)

Now the theory I have already outlined is in direct opposition to this. Law, as I contend, is the formulation of purposive Will, and Cause, the energy with which such formulation is carried out and enforced. It stands in direct contradiction to both Chance and that doctrine which makes Law an eternal sequence, whether with or without "metaphysical constraint." And the thought contained in the last phrase quoted is an utter misconception. The notion that "Will is no more than a mere necessary concatenation of events," can obtain only after both Mind and Force have been relegated from the field. It is only

consistent with the theory of blank Necessary Atheism, the theory that Matter is the only real existence in the Universe. That this notion is untenable to the extent of absolute intellectual negation and suicide, has already been shown.

The other argument is, that in willing, the Mind necessarily has to choose between *motives* and as necessarily chooses in the line of the stronger motive. The first part of the proposition is generally conceded ; perhaps, universally so, for I do not remember having met with the contrary view ; and being conceded, it is extremely difficult to avoid the conclusion. But is the concession itself proper ? Is it true that in willing the Mind does choose between motives ? I think most clearly not ; for, as a matter of fact, the Mind never has but *one motive before it at a time*. The latter proposition will become apparent upon a little reflection. As has been shown, it may repeatedly call up new associations of thought, successively ; and this may be done very rapidly ; but it will be found that the Mind cannot contain more than one associated group at the same time ; all its contents, at any single moment, are amalgamated into a single picture ; they are not and cannot be held off as distinct pictures on the walls of Consciousness and measured and weighed as such ; and constituting a single group, a single mirrored concept in Consciousness, it is attended by a single feeling or group of feelings which may be of beauty coupled with desire and hope, or of ugliness with hate, aversion, and dread ; but whatever it is, it is for the moment whole, complete in itself, single. Others like, or very unlike, may rapidly succeed ; and so motives similar, or very dissimilar, may present themselves to the mind with remarkable rapidity, but always singly, one at a time. So there can, in fact, be no comparison between them, no measuring of them beside each other, no weighing or balancing them against each other. On the contrary, they pass through the Mind in single file, until somewhere

along the line, the spring of activity is touched, a volition leaps to life, an act of willing is formulated, the act is done, the hand lifted, the sentence written.

PROF. BASCOM says : "A motive is not an efficient force acting with momentum on the mind. In that sense motives do not have weight. But the mind moves toward them, springs up in power with reference to them. * * * The entire vocabulary of the necessitarian is at fault, it is figurative and he insists on using it as literal. * * * If there is no other way of weighing motives than by the mind's response to them, we reason in a circuit when we say the mind obeys the strongest motive. * * * To say in one breath that the will is governed by the strongest motive, and in the next that that motive is the strongest which governs the will, is to reason in a circle. * * * The entire notion of the influence and force of motives comes from causation and is impertinent to the department of mind." (*Science, Philosophy, and Religion*, p. 202.)

Perhaps it will be replied that this argument only obviates one difficulty by precipitating another; that admitting that there can be no balancing and choosing between motives according to *weight*, yet it does not follow but that the Mind's eye measures each motive as it passes in file and is *moved* to act when, and only when, a motive of certain size and weight comes into view; that it requires motives of certain definite measure to set off the spring of volition; and that the Mind, necessarily, leaps into activity when, and as often as such appear before it. This is a theory of some plausibility, but, as I see it, *only a theory*, without supporting evidence. Instead of *proving* Necessarianism it is founded upon the *assumption* of that very doctrine. It *assumes* that volition cannot be set free until *something* extraneous comes along to touch the spring; and, that a strong enough motive is such a *something*. But this assumption is the very question at issue. The question is: Is this assumption true? And it cannot be made to prove itself.

Then what argument, on the other side have we for free volition? First, the general argument in favor of Purposiveness as against Necessity; as has been all along contended, it must be one to the exclusion of the other. In one we have Mind a real existence, a subsisting entity, an essential something; in the other we have Mind as only a phenomenon, only a *process*, only one phase of the resultant action of self-co-ordinated forces. Every aspect of the analysis, so far, would indicate that it is the former and not the latter. But the former doctrine of Mind involves the proposition of spontaneity, of self-determination, of a capacity for uncomelled, self-initiatory action; otherwise it is not Mind but simply a phenomenon back in the category of necessitated mechanism. Either Mind is free, voluntary, and purposive, or else Man is a set of wheels cogged in together, and the whole cogged into the great machine of Nature; in which case, Mind drops to the simple process of a grinding of the cogs one upon another. PROF. BASCOM says: "Mind as mind is spontaneous in its action; its activities spring from itself, and do not, as in the case of matter, exist in it as definite realized forces. * * * The spontaneity of the mind is not a measured force, gauged to certain facts, but from itself, and of itself, with fitful efficiency, evokes its thoughts and feelings." (*Ibid*, p. 187.)

Next we have the voice of Consciousness. In the great events of life, and in the acts so small that we scarcely take note of them at all, as well as in the process of controlling and concentrating Attention to the bringing forward and marshalling of associate thought, Consciousness testifies that Mind acts voluntarily. That this is so anyone who has the energy to reflect, even ever so superficially, on his own mental processes, must admit. Even PROF. FISKE admits that it is the almost "universal opinion that men can voluntarily determine their own actions." Says he:

"With the exception, therefore, of those theological fatalists who assert that human actions are

determined by an external constraining power, it is the universal opinion that men can voluntarily determine their own actions ; and this is just what the much abused testimony of consciousness amounts to. This is all that it means to any one not mystified by metaphysics ; the non-causation of volitions being a theorem so far from obvious to a great many men, that it requires considerable explanation to make them understand it. . . . The question at issue is not whether the actions of men are normally free, but whether this freedom is consistent with their being caused. The asserters of Free-Will maintain that causation is inconsistent with liberty. The so-called necessarians assert that liberty and causation are quite consistent with each other. To which we must now add, that it is not causation, but the absence thereof, which is as incompatible with liberty as it is with law." (*Cosmic Phil.* Vol. 2, p. 182). This is interesting. PROF. FISKE first admits that it is "the universal opinion of all men that they can voluntarily determine their actions," and that "this is all the much abused testimony of consciousness means to any one not mystified by metaphysics," and then resorts to a profoundly metaphysical argument to prove that "the universal opinion of all men," is utterly at fault. Seldom is it that a great thinker is found to squarely face about on so small a bit of ground.

But clearly his argument is founded upon the assumption, explicitly or implicitly expressed, that the exertion of Will is a necessary effect, in a necessary line of sequences reaching back to the beginning of things; but a necessary phase in an unalterable and unending chain of causation ; a necessary resultant of a necessary collocation of forces necessarily co-ordinated by reason of unalterable laws necessarily and eternally imbedded in their very constitution. Contrasted with this, as repeatedly shown, is the doctrine that the exercise of Will is a self-determined, initiatory upspringing from the

depths of inherent self-potency into an activity, dominating forces and causes, and on lines that are a law unto itself and unto them. Every motion, every force, and every cause, has back of it such self-sufficiency and self-potency, manifested in such initiatory self-determinative springing up into activity. So the two doctrines are not only contradictory, but necessarily, always and everywhere, mutually exclusive. They cannot stand together. One or the other must go down. And Science, Philosophy, Socials, Morals, Religion, must be one thing, or another very different, as the one doctrine or the other prevails. The one gives us thought, Will, Mind, and Soul, as resultant processes of the grinding of eternal forces; and Deity, if Deity at all, as a necessitated eternal, impersonal, unintelligent, and involuntary Power over-hovering all. The other gives us thought and will as the products of a conscious existing entity, with the faculty of self-determination and self-initiation of activity, called Mind or Soul; and a Deity, personal, intelligent, purposive and voluntary, and whose will is law and initiatory of all change.

But Consciousness never testifies to a present act of willing, it never catches the Mind fabricating volition; just as thoughts and feelings are in the Mind before Consciousness recognizes them, so it is with volitions. Hence we may be conscious that we *have* acted freely, acted one way when we could just as readily have acted in another way; we may be conscious that we *can* act freely, that we can do this, or that, or neither, as we choose; but we are never conscious that we *are* forming a *free* volition, nor any other kind of volition, for that matter. We never witness its formation. For every act of past life, we have a consciousness that we could have willed to do differently; for every motive prompting to future action, we are conscious we can will to do one way or the other; and either Consciousness is veracious or mendacious; speaks the truth or lies.

And there is no other witness than Consciousness to be expected, nor, in the nature of things, possible. Consciousness is the recorder, standing at the gate of intelligence to note down all that passes in or out; its record must be accepted as veracious; there is no imaginable way in which the Mind can know its own modes, what itself does, except through the use of its own subjective eye; by looking in upon itself; and having done so, and taken note of what it there sees transacted, the record is positive, and should be accepted as absolute. All objections are but metaphysical negative testimony.

And all practical life is brought down to this measure. The self-determining faculty is practically everywhere admitted, and respected in business, in socials, in politics, in law, in ethics, in religion, and in philosophy. Without it no action, no phase of conduct, can have any moral quality. The very notion of morality at all is predicated upon the idea of a self-determining capacity. If I do a thing which I cannot help doing, which comes about by reason of a natural and necessary sequence of events, whether causally connected or not, it can be neither right nor wrong; it can have no moral quality in it any more than either a gentle zephyr, or a wild tornado can have moral quality; and there would be no more justice, or reason, in rewarding or punishing me for it than in rewarding or punishing a south wind, a northern blizzard, a drouth, a shower, or an earthquake. The very soul and reason of all rewards and punishments are predicated upon the free volition of the Mind. No jury would ever convict of crime, and no judge ever sentence a man, were it not believed that he acted *freely*; that he had the power of willing to do differently. That is the very soul and reason of the distinction in the common law between sanity and insanity. The law presumes that the sane mind acts voluntarily, without restraint, moral, metaphysical, or other; that it has the capacity of willing to act one way or another; while the

insane mind has lost this capacity, is under constraint, and cannot *choose* its ways. PROF. FISKE argues that although the Will is involuntary, nevertheless, the fear of punishment has a restraining influence upon it because it becomes one of the necessary motives forming a part of the constraint by which it is shackled and under which it acts. He insists, therefore, that it is right to punish for crimes which the perpetrator, under the conditions of mind in which he found himself, that is, under the tyranny of motives, (or, metaphysical constraint, as we may call it), could not but choose to do, was helpless to avoid; because the fear of expected punishment adds a fresh constraining motive which may be able to dominate choice of action. But this is arguing in a circle. If the fear of punishment be only an added shackle upon the Will of the criminal, nevertheless it must have been freely planned and purposed for that very object by the makers and administrators of the law. They must have reasoned: "If we throw the tyranny of this motive over his will, he will avoid crime; otherwise, left to the tyranny of present motives, he will commit crime." Or if these, too, were compelled by the tyranny of other motives, to throw the tyranny of this motive over the mind of the criminal, the whole thing is carried back to inevitable and eternal Necessity, and the soul of reason drops out. Each motive becomes an eternally forged shackle upon the will; and the mind of man, not of one man, but of every man, is as helpless in its iron fetters as is the cyclone in its fury, or the fires of Vesuvius under their mountain load. It is simply a deceptive makeshift, a yoking of contradictory theories, to deny free volition to the mind, and then talk about precepts, tuitions, trainings, commandments, laws, motives; for all these must run back for their cause of being to the eternal beginning of things, and come along down the stream of eternal Necessity together. Oriental Fatalism is the only consistent theory of Necessity.

All others are but half and half. They commence very well but they dare not follow on to logical conclusions. Somewhere along the line they are compelled to open out for a section of free volition, else they run into absolute Fatalism without remedy.

Conscience has its roots in the same faculty. Deny to Mind the capacity of determining to do or not to do, and you destroy both the reason and utility of conscience. No mind could upbraid itself for doing what it believed it was compelled to do from the power of motives, metaphysical constraint, or otherwise; and if it could do so, no benefit could accrue therefrom. Imbue the mind with the belief that "what is to be will be," and that even its own feelings, desires, motives, and volitions are *necessitated* and utterly beyond its own free and personal control, and you deaden every moral sentiment and motive; you kill the will and the energy; you cast such mind a helpless waif on the current of existence. Even PROF. FISKE's added motive of the fear of punishment will not beneficially reach the mind which truly believes that it has no free capacity to act in avoidance of it.

Every word in any language having any quality of ethical meaning has grown out of the testimony of Consciousness to "the liberty of the will." The whole potential mood of the verb is predicated on freedom and power. *May*, *can*, *shall*, and *will*, mean that Mind carries within itself a self-determining potentiality, a self-acting spring of activity. Doubt of this can be accomplished, as we have seen, only by arraying metaphysical reasoning against the open deliverances of Consciousness; by discrediting and belying Consciousness. It is like arguing with the eye that it does not see, with the ear that it does not hear, with the tongue that it does not taste. A strong argument might be pitched against the seeing of the eye, and one might even consider himself convinced, nevertheless, every practical act of life would be controlled by and dependent upon sight.

So one may frame a large argument against free volition, and even persuade himself that he has succeeded in mutilating Mind to that extent; while, at the same time the very language in which his proposition has necessarily to couch itself to be intelligible at all, as well as every practical opinion, plan, purpose, and act of his life, postulates a self-determining will, a faculty of Mind that makes it a law unto itself, and enables it to start up by reason of uncaused and inherent self-potency to dominate and control forces and causes.

Even when Volition has a background in a formulated purpose, as it very frequently has, Will and not Purpose is supreme; we are still conscious of the power of either conforming to purpose or of disregarding it. The Mind can forge no intention, purpose or plan strong enough to fetter Volition. All these are but play-things of the Will, as the conscious experience of every reflecting human being testifies.

PROF. FISKE calls freedom from all extraneous compulsion, such as the commands of a human master, or the legal requirements of the State, Liberty of Will. I consider that it consists in exemption from necessity to certain lines of thought and action, growing out of an eternal and unalterable chain of necessary sequences, or arising from an inevitable succession of events, whether causally connected or not. PROF. FISKE, as we have before seen, makes what I call freedom of the Will a synonym for lawlessness, and what he calls *liberty* I consider Necessity.

The real point of difference between us seems to be that he makes Law, eternal and unalterable, the supreme condition of existence; while I make purposive, voluntary Intelligence supreme over Law, and all else. He puts Law above Mind, I put Mind above Law. All the Mind he allows is the product of Law; all the Law I allow is the product of Mind. With him Mind is a process or resultant from the

necessities of Law. With me Law is a resultant of the processes of spontaneous *willing* by Mind. If he asks me how Mind can *will* except according to some necessary law of its being? I, in turn, will ask him how Law came to be supreme were there no potentiality behind it? Here we arrive together at the unfathomable, from whose depths no legitimate argument can be drawn for or against either theory; and where, therefore, the arbitrament of Consciousness must be accepted.

Is it said that unnecessitated volition is incomprehensible? So is any fact or phenomenon of existence in its last analysis. The human mind is incompetent to penetrate to the extreme essence of any existence. It cannot be expected that it should be able to grasp the very essence of its own deepest springs of action. The eye cannot see itself see. The Mind might have *reflected* upon vision eternally without comprehending anything about it. It was only by extraneous examination and experiment on the laws of light, and the anatomy of the eye, optic nerve, and brain, that anything has been learned of vision. No more can Mind fathom the depths of the process of willing. It cannot get outside of itself so as to look in upon and through itself to the secret initiatory essence of action. It cannot reach beneath Consciousness, and Consciousness gives only the form of the completed processes of mental action; it does not unfold the uncoiling of the initiatory spring as it awakes to action.

But it is yet true, that each of these volitional efforts, though freely spontaneous, are possible only on condition that the Mind shall cross back beyond the abyss, and use the material instrument of brain molecules in accomplishing the purpose; and this, no doubt, by calling upon *Life* to concentrate its forces in producing certain cerebral tremors; and the *fact* is then, in turn, interpreted across as into a conscious exercise of Will. So intimately and blendedly dependent are all the phenomena of *Life* and

Mind ! With native and inherent spontaneity, Mind consciously directs and commands action through and by *Life*, which commands *Life* is compelled to obey and carry out, through and by processes wholly its own, and under its own control. So it turns out that the human Mind, as we know it, is a many sided, unital entity, tied to a material organism which it builds as both a habitation and utensil, and without the use of which it is equally helpless to accomplish the minutest mental process, to compel the smallest physical movement, or to build, repair, and keep in life the organism itself. *Life* is the side of Mind which builds, repairs, and uses the organism through the instrumental medium of its central system of brain and nerves, as well as carries certain forms of sense phenomena, and also, perhaps, all absolute truths to the brain. Sensation receives and carries to the same central organ the contactual impressions of the exterior world which form a basis for all our knowledge of Nature. The interpreting faculty takes up certain of the characters written in molecular vibrations on the brain and interprets them across the way into mirrored images on the walls of Consciousness, where the cognitive faculty by throwing itself back across the depths and calling for other tremors, reads them off, and becomes conscious of them, together with certain affections, feelings, emotions, and notions of "the true, the beautiful, and the good," or the contrary, as well as certain attendant motives and desires which have fallen into line somewhere along the way, and been wafted over with them. And then on occasion, and as it listeth, the Will, which seems but a supreme phase of the cognitive faculty, or perhaps more properly, a supreme, unital, personifying phase of all the faculties, or the manifestation of the supreme *soul-reality* back of all faculties, with self-determination and spontaneity, springs up with an original and otherwise uncaused command over all the faculties ; but like all else, it has to cross back to effect either

command or conscious phenomenon by having it traced in cerebral vibrations.

And this leaves my two arguments against Necessity intact and unscathed, to wit: the infinity of the chances against it, otherwise called the Argument from Design, and the Testimony of Consciousness.

CHAPTER V.

HEREDITY.

DEFINITION.

The principle of Heredity, lies in the fact that the offspring, in whatever mode reproduced, partakes more or less closely of the parental characteristics. Naturally several momentous questions present themselves for answer in the discussion. What is the *cause* of Heredity? What is the *mode*, otherwise the *law*, of its action? What are the effects of Heredity, that is, what does it do? But first, it is clear from the definition above that Heredity is not a *thing*, not an *entity*; but a *process* only, only the inheriting of qualities from the ancestor by the descendant. Then not being a *thing*, it cannot itself be a *cause*, cannot itself *do* anything; so it is never proper to say Heredity does so and so, does this or that. It is only the manner, the process, the way, in which a *something* works in a certain doing, to wit: in stamping the features of the parent on the child. Or, more exactly yet, it is the mode in which that *something* which builds up the new creature acts in fashioning it after parental forms, as well as the intelligence and potentiality which it exerts in the process.

There is another principle, *Variation*, of almost equal importance, so closely connected with Heredity that an intelligible discussion of one includes the

discussion of the other ; so that, in fact, they are usually considered together under the head of Heredity ; indeed, some authors seem to think *Variation* the chief factor to be accounted for. But they equally demand explanation : Heredity, of how offspring comes to resemble its ancestry ; and Variation of how it comes not to resemble it.

THE COMPULSORY FACTOR IN HEREDITY.

But some will say there is no intelligence exhibited in the process, and that the phenomenon is not produced by any *something* at all ; that it is only the resultant of the action of certain physical forces which meet and correlate amongst themselves, by reason of necessary and innate laws imbedded in their very constitutions, respectively. But this is going back, as we have seen in so many other instances, to absolute Necessarianism. It is banishing thought and mind from the universe. But more than this, whether these forces are said to be merely attributes or properties of the material atoms, as held by BUCHNER and others, or whether they are admitted to have an independent existence, they are, by this theory, made of infinite potentiality ; for they enter with equal facility into every material combination, organic, or inorganic, and correlate and co-ordinate with each other equally well in every possible material substance. And all this without direction or intelligence, but simply by virtue of constitutional, innate tendencies in them. Thus an atom of hydrogen, or the force controlling it, will, with equal facility, by reason of its intrinsic but unintelligent capability, and without any outside or superior direction, aid in the building of any one of the countless organisms, or carrying on any one of the numberless functions, of the infinitude of living beings now peopling, or which may people Earth. And every other atom of hydrogen, and every atom of oxygen, carbon, nitrogen, iron, phosphorus, etc., or

the force governing it, possesses the same capabilities. And this capacity of atoms or forces almost infinite in number, is such that in every instance, they so balance and correlate with each other as to present the appearance and semblance of plan and purpose, *of work performed with a copy or pattern in mind.* Now what logical aspect does the proposition thus viewed present? Evidently one of two alternatives, either that there is no such thing anywhere in existence as *intelligence* at all, or else that the *unintelligent* can do, and does, *intelligent work*, almost infinite in variety and quantity; that is to say, that either there is no intelligence at all, or else, what is logically equivalent, that there is no distinction between the intelligent and unintelligent, for either alternative stultifies reason, and makes all argument, and all investigation even, but whimsical trifling.

Therefore, in this discussion, I shall all along assume, and, as occasion arises, offer the proof, showing that living beings are products of intelligent action; that the forces which mold into suitable molecules, the atoms of the elemental principles which enter into their composition, these into appropriate substances, these into necessary organs, and these again into living individuals, on plans and patterns, and fitted to accomplish certain ends and purposes, as well as the forces which are subservient to all the functions of life, are all intelligently directed, adjusted, and balanced, so that their resultants move in the tracery of the plan, and patterns of form and function of the particular typical species, variety, or character of organism to which the being belongs. Such intelligent action, I believe, and shall attempt to show, is produced by a *something* within the organism itself, and this *something* with the intelligent capacity of controlling and directing necessary physical forces in such handling of the atoms of the appropriate elements as to mold them into living molecules, cells, substances, organs, and beings; and, also, of carrying on all the functions of life; and all

this, according to certain intelligently formed and selected plans or patterns. And further, I shall argue, that this *something* in each living being, is also endowed with the higher intelligent capacity of putting into germs other like *somethings*, which, under favorable circumstances, will build them up into mature individuals, with still like capacities. The phenomenon or process of the building up of a new creature from a cell secreted, or germ produced by a prior individual is Reproduction; but the phenomenon and mode of action by which the new being is made up on the plan of the original is Heredity. Perhaps the best expression for the intelligent *something* which produces all this phenomena is *Vitality*, *Life* or *Life-principle*.

In immediate connection with and preparatory to the study of the great doctrine of Heredity, which demands so much attention in every biological investigation, some notice must be taken of the several modes of reproduction of living beings.

REPRODUCTION BY FISSION.

The earliest mode of life reproduction is by cleavage or fission, a dividing of the lowly being into two or more parts, each of which becomes a complete individual after the kind of the parent before division.

PROF. JOSEPH LECONTE says (*Ev. and Religious Thought*, p. 219): "In the lowest animals and plants multiplication of individuals and the continuance of the kind are independent of sex, and therefore in such there may be no sex at all. The sexual elements are not yet differentiated. An individual divides itself into two; each grows to the original size and again divides into two, and so on, it may be, indefinitely."

DR. BEALE says: "No language could convey a correct idea of the changes which may be seen to take place in the form of the living mucus or pus corpuscle; every part of the substance of a corpuscle

exhibits distinct alterations within a few seconds. From time to time, some of the small spherical portions are detached from the parent mass, and become independent masses of germinal matter, which grow until they become ordinary mucus corpuscles." (*Protoplasm*, p. 42).

" This clear, transparent, structureless living stuff came from stuff like itself, which had similar powers and properties. Here is a thing increasing in size and then separating so as to produce many like things." (*Mystery of Life*, p. 21.)

PROF. HAECKEL says: " By means of this assimilation of nutriment and dissolving the particles in its protoplasm, the Amœba grows; and, after it has reached a certain size by this process, it begins to reproduce. This occurs in the simplest way by division. The enclosed nucleus first separates into two pieces. Then the protoplasm distributes itself between the two new nuclei, and the whole cell parts into two similar cells, in consequence of the growth of the protoplasm round the two nuclei." (*Evolution of Man*, Vol. II. p. 143.)

Says EDWARD CLODD, of the Amœba: " When, by the assimilation of food, it has reached a certain size, it divides equally at the kernel, or nucleus. The protoplasm distributes itself around each nucleus as the two part company to grow and divide again in like manner, and so on *ad infinitum*, each half being a separate individual exactly like its fellow, and passing through the same stages of growth and fission. (*Electric Mag.*, Feb., 1890, p. 231).

" Another very simple yet important part of the structure of the Amœba must be observed. It is the *nucleus*. Within is also another small dot named the *nucleolus*. These are the germs of future generations. The power and potentiality of life are stored carefully here; and consequently when a division is to take place a portion of this important matter must go along with each half. When fission is about to occur, a constriction, slight at first, is

seen going on on each side of the main body of the Amœba, which, gradually increasing, at length embrace the nucleus; the nucleus then divides, giving half of its contents to each part, and resuming in each its perfect form and function. The appearance now presented is that of two *Amœbæ*, just linked together by an ever lessening tie; and this finally parting asunder, the two forms pursue (each one for itself) its own independent existence." JOHN BADCOCK, (*Vignettes of Invisible Nature*, p. 60.)

" You may take a Hydra, and cut off its head and engraft it on another; or you may exchange heads one Hydra with another. You may cut up one animal into forty or fifty pieces and each piece will become a perfect and completely formed Hydra." (*Ibid.* 63.)

Without reflection it may seem entirely natural and easy of comprehension that since there is a material division of the substance of the individual, each half should possess precisely the capacities of the original. And this view would be entirely correct, no doubt, if the organic being could be regarded as *only* material, as *only* a highly complex mass of matter with *only* physical properties. But as we have seen, it is much more than this. It is a mass of matter, but matter with much else than the ordinary physical properties of matter, with those higher properties and capacities denominated *Life*, the lowest of which comprehends, as has been shown, such command and control of physical forces as to enable it to carry on nutrition, reproduction, and differentiation.

Now while the division of the mass of the material organism is readily comprehensible, the division of the *Life*-principle is not so easily grasped in thought. But it is apparent that along with the physical growth there must have been a growth of the *Life*-principle; so that, when the period for division arrives, each has been duplicated in amount or quantity. After division each mass is physically, organically, and

chemically like the original, and in each the *Life*-principle has the same capacity—the capacity of carrying on the same processes and projecting the same differentiations. That is to say, one directive *Vitality* or *Life*, has grown, and then split into two each part endowed with the same degree of intelligence and potentiality that the single parent originally possessed.

REPRODUCTION BY BUDDING.

A little higher mode of reproduction is by budding, as seen in some of the lower animals, and most plants, where a new centre of *Life*-principle being formed, drops away or is removed to form an independent individual in the parental similitude.

PROF. LECONTE says: "The next step in the ascending scale is reproduction by *budding*. In this case a bud is formed which grows into a perfect individual, and may remain attached to the parent stalk, forming together a compound individual, as in most plants and many lower animals, such as the coral; or it may separate and assume independent life as in some plants and many lower animals. In still other animals, as in many hydrozoa, the budding function is relegated to a special part, which thus becomes a reproductive *organ*. The next step is the placing of the budding organ, for greater safety, in an *interior cavity*. This is the case with aphids. Now why would this not be an excellent mode of reproduction for all animals, man included? The fundamental reason, in connection with evolution, is *the funding of individual differences in a common offspring, thereby giving to the offspring a tendency to divergent variation*.

"Now, *non-sexual* reproduction is *absolute true breeding*. The law of like producing like is absolute. Heredity is all-powerful, and tendency to variation is *nil*. These modes of reproduction are in fact but a modification of growth and an extension of the individual. Evolution-changes in animals produced

in this way only must be very slow, since the most powerful factor of evolution, viz., natural selection among divergent varieties of offspring would be wanting."

Let us follow this process a little way. The *Life-principle*—say in an apple tree—concentrates assimilated material at some point in manner and form known as a bud. This is done intelligently and for a purpose. But more than this, in that bud it places another *Life-principle*, at first in connection with and dependent upon itself, but afterwards capacitated for independent and individual action, and with full potentiality for building up another apple-tree like the parent tree. And not only one bud and one new *Life-principle*, upon one occasion, does it thus originate, but countless thousands of them and for many successive seasons. The parent tree itself started, perhaps, from such a bud, a tiny thing in size, in power, in intelligence; but with the capability of more than stocking the whole world. And in each of the buds it forms, it wraps the like *Life-principle*, with the like capacities.

Where does it procure the "stuff" for such manufacture? We know that it gets the *material* constituents from earth and air, but whence comes the *Life-principle*? The question is indited not for answer now, but to emphasize the fact that the first individual of a line, no more contains in itself all the *Life-principle* of all the individuals which may spring from it, than does it contain all the material which may enter into the forms of the same. It starts as a bud, it grows by drawing to itself both matter and *Life-principle*: it forms other buds of such matter digested and assimilated to such use: and in each of them enwraps, from the *Life-principle* so drawn to it, a new centre of life, a new *Life*, with the same capacities and fitted to run the same round, under like favorable conditions.

This is the grandest fact in all the history of living beings. It must lie at the very basis of the philos-

ophy of Biology ; and yet, it has, heretofore, been almost entirely overlooked. Theories and systems have been founded on incidents growing out of the great fact, which has itself been neglected.

DARWIN, SIR WM. TURNER, and others, explain this by saying that in each cell of the bud is placed a gemmule from each cell of the tree itself. To be of any value whatever this theory must assume that the *knowing how* inheres in the material gemmules, that *knowing* is a faculty of matter, that mind is only a property of matter ; which theory we have everywhere seen is entirely untenable. And if *knowing* is distinct from matter, if there be in the universe a *knowing principle* diverse from matter, then it must be that in the tree, and in the bud, we have portions or manifestations of such principle.

SEXUAL REPRODUCTION.

The highest mode of reproduction is through the principle of sexuality, where cells of different potentiality, called male and female, coalescing, originate a third individual which develops under appropriate circumstances into a mature being more or less after the parental pattern.

PROF. LECONTE says : "The same organ prepares two kinds of cells, male and female, germ-cell and sperm-cell, which by their union produce an egg which develops into an offspring ; and not only an offspring in the separated part of a previous individual, but in some sense a new creature, the creation of a *new individual*. There is an enormous difference and even contrast between this and all preceding modes. In non-sexual modes one individual becomes two : in this, two individual cells unite to form one. . . . Thus far we have given only the lowest form of sexual generation. The two sexual *elements* only, germ-cell and sperm-cell are separated from each other, but not yet even the sexual organs, ovary and

spermary, much less the sexual individuals, male and female. The sex-element forming function is next differentiated and localized in two different organs, ovary and spermary, but not yet in two different individuals. This is hermaphroditism so common in plants and in lower animals. The already separated sexual organs are next localized in different individuals, and we now have male and female individuals. This is the case in many plants and all the higher animals." (*Monist*, Vol. I, p. 324.)

The question to be now answered is: What is it that, in these three modes of reproduction, makes the progeny follow or resemble the parentage? Several theories have been advanced by biologists, each, as will be seen, attempting to solve the problem without the introduction of any intelligent factor. Each is essentially mechanical and non-purposive, depending for explanation on material elements, aided at most by unintelligent forces. In this direction MR. DARWIN puts forward the theory of *Pangenesis*, or the notion that each cell in the parent body contributes particles, which he calls gemmules, to the sexual elements through which they pass to the germ of the new being. He says: "It is universally admitted that the cells of the body increase by self-division, thus forming the various tissues. Besides this, I assume that the cell units throw off minute granules, which are dispersed through the entire system. These may be called gemmules. They are collected from all parts of the system to form the sexual elements, and their development in the next generation forms the new being. They are thrown off by every unit not only during the adult stage, but during each stage of development of every organism. Hence it is not the reproductive organs, or buds, which generate new organisms, but the units of which each individual is composed. Gemmules are capable of transmission in a dormant state to future generations, and may then be developed." And again: "According to this

hypothesis every unit or cell of the body throws off gemmules or undeveloped atoms which are transmitted to the offspring of both sexes, and are multiplied by self-division. They may remain undeveloped during the early years of life or during successive generations; and their development into units or cells, like those from which they were derived, depends on their affinity for, and union with other units or cells previously developed in the due order of growth." (*Descent of Man*, p. 124.) ST. GEORGE MIVART thus describes the doctrine.

"Pangenesis may be thus stated: Each living organism is ultimately of an almost infinite number of minute particles, or organic atoms, termed gemmules, each of which has the power of reproducing its kind. Moreover, that these particles circulate freely about the organism which is made up of them and are derived from all the parts of the organs of the less remote ancestors of each such organism during all the states and stages of such several ancestors' existence; and therefore of the several states of each of such ancestors' organs. Such a complete collection of gemmules is aggregated in each ovum and spermatozoon in most animals, and in each part capable of producing by gemmation in the lowest animals and plants. In many of such lowest organisms such a congeries of ancestral gemmules must exist in every part of their bodies since every part is capable of reproducing by gemmation. Mr. Darwin says, each cell of a plant has the power, actual or potential, of reproducing the whole plant in virtue only of containing gemmules derived from every part." (*Genesis of Species*, p. 224.)

PROF. HAECKEL has propounded his theory of *Perigenesis* in the following terms:

"We must conclude that this ultimate cause of all the phenomena of life, that the invisible activity of the organic molecules is a branched wave-motion. This true and ultimate *causa efficiens* of the biogenetic process I propose to designate by a single word,

Perigenesis, the periodic wave-generation of the organic molecules or plastidules.

"The peculiarity of this branched wave-motion of the plastidule depends upon the reproductive power of the plastidule, and this again is brought about by its peculiar atomic composition. This power of reproduction which alone renders possible the multiplication of the plastids is, however, the equivalent of the *memory* of the plastidules.

"This brings us to Ewald Hering's ably established view that unconscious memory is the most important characteristic of organized matter, or more properly of the organizing plastidules. Memory is the chief factor in the process of the development of organisms. Through the memory of the plastidules the plasson has the power to carry over from generation to generation by inheritance, in continuous periodic motion, its characteristic peculiarities, and to add to these the new experiences which the plastidules have acquired through adaptation in the course of their evolution.

"I have shown that each organic form is the necessary product of two mechanical factors—an inner factor, heredity, and an outer factor, variability, or a power of adaptation.

"By the hypothesis of perigenesis we are able to more sharply define these two fundamental laws of the modification of organisms, for *heredity is the memory of the plastidules : variability is their power of perception*. The one brings about the constancy and the other the diversity of organic forms. In the very simple and persistent forms of life the plastidules have, so to speak, learned nothing and forgotten nothing. In highly perfected and variable organisms the plastidules have both learned and forgotten much." (*Haeckel*, p. 37).

And again: "Perigenesis seeks to explain Heredity on a simple mechanical principle, namely, by the well-known principle of transmitted motion. I assume that in every process of reproduction not

only is the special chemical composition of the plasson or plasma transmitted from the parent to the offspring, but also the special form of molecular motion which belongs to its physico-chemical nature. In harmony with the fundamental laws of modern histology and histogeny, I assume that this plasma is alone the original bearer of vital activity, and hence also of heredity and reproduction. In all plastids this plasma or plasson is composed of plastidules or plasma-molecules, and these are probably surrounded by aqueous envelopes; the greater or less thickness of these aqueous envelopes, which at once separate and bind the neighboring plastidules, determines the softer or harder condition of the flowing plasson.

"Heredity is the transmission of plastidule motion, whereas adaptability is a change of plastidule motion. This motion may in its general aspects be conceived as a ramified wave-motion. In all protists or unicellular organisms this periodical movement of the mass goes on in a correspondingly simple manner, while in all tissue-bearing or multicellular creatures it is combined with a mutual generation of the plastids and a division of labor with the plastidules."

MR. SPENCER accounts for Heredity by the use of what he calls "physiological units," somethings which are living elements, or active principles of the cells. These he imagines are able to carry into new beings the likenesses of the old.

PROF. WEISMANN has propounded an hypothesis known as the theory of the *Germplasm*, which is thus stated by PROF. LECONTE: "The animal body consists of two kinds of cells wholly different in function, somatic cells and germ-cells, including in this last the sexual elements both male and female. Somatic cells are modified and specialized for the various functions of the body; germ-cells are wholly unmodified. The somatic cells are for the conservation of the *individual* life, germ-cells for the conservation of the *species*. Now, according to WEISMANN, *inheritance is only through germ-cells.*"

SIR WILLIAM TURNER thus summarizes the hypothesis: "Each animal organism isolates from the cells constituting the bulk of its body certain other cells which have no function as regards the parent body, but are associated with it only for purposes of their nutrition. These cells are termed pronuclei, and they have the sex of the parent which produces them. When a male pronucleus and a female pronucleus come together a portion of the germ plasm is extruded from the egg to form what are called polar bodies, about which the microscopists as yet tell us nothing. The result of the fusion or union of the pronuclei is termed the segmentation nucleus. It is still microscopic, but within it is the adult body. The eye of science has seen that it is not a homogeneous, formless substance, but is delicately organized. Fibrils called chromative filaments are observed, which coil and intersect, enmeshing a viscous something not yet analyzed. These filaments are seen to swell and arrange themselves at first into one and then into two starlike figures, which then divide. The division is repeated again and again. These cells at length arrange themselves into what are termed germinal or embryonic layers and from these layers arise every tissue and every organ of the body. If the process has been followed it will be seen that the chain is complete. There is no cell in the adult so infinitely small that it does not contain a fragment of the segmentation nucleus. Nay, more, the fragment which each parent has contributed to that nucleus was received from the previous generation. The parental dilution is almost inconceivable even to a Hahnemannian. But, on the faith of these observers, it is an eternal verity that there is an absolute, physical, material continuity between every cell in the body of the child and every cell in the body of the parent. Man is indeed a wonderful creation. But what can be said of the marvelous particle, so minute that it almost escapes artificial vision, and yet of chemical and molecular

complexity and potentiality so out of all proportion to the bulk.

"Both the likenesses and unlikenesses between parents and children present both a theoretical and observed agreement with this announcement. When the polar bodies are extended, more or less of either parent may go to the fusion of the male and female pronuclei into the segmentation nucleus. And the molecules within the segmentation nucleus, the starting point of each generation, are capable of changes in form, size, and position. Thus either parent may predominate in the offspring by actually contributing a greater portion to the germplasm, and a reversion to an ancestral type is readily explained by the physical continuity, not only between any two generations, but between all. And variations, or what florists call 'sports,' may arise simply from changes among the molecules of the germplasm."

Of these several theories, it may be remarked in the first instance, that they are *only theories* without one particle of evidence to support any of them. A great biological problem is facing scientists and these several hypotheses have been put forward to *feel*, if possible, towards a solution. That is all the worth either of them can claim. They can make no pretense to being facts; and, even *were* they facts not one of them would explain anything. What is wanted is the *how* a bud, or seed, or an egg-cell, comes to reproduce the parent form. To say that a *gemma*, or a *plastidule*, or a *physiological unit*, or a *germ-cell* passes from the parent into the germ, explains nothing at all. It still remains to be shown from *how* the *knowing how to do* is *carried over* from ancestor to offspring? how is it *carried over* by *plastidule*, or *gemma*, or *unit*, or *germ-cell*? If these particles are simply material, how do they carry with them power, and plan, and type, and knowing how to do? If they carry "ramified wave-motion," how is the difficulty helped out? Can such minute motion carry all the motion, and power, and

plan that is to appear in the progeny? Will it be able to absolutely create power and plan? How does it carry the ancestral type and pattern? Or if you take Mr. Spencer's "physiological unit," what better is it? How does it carry all the potentiality that is to appear? How does it take over the parental pattern? Where can there be any explanation short of *an intelligent and potential principle carrying with it ancestral types?*

And it may well be asked, how can such potency be impressed on material atoms or motions? How can an unintelligent material atom be so manipulated by *any power* whatever as to compel it "to carry in its bosom," as MR. HINTON expresses it, not only the potentiality, but the intelligence, the plan, upon which to compel other unintelligent material atoms to form themselves into certain substances and organisms of definite and particular form, shape, type, and pattern? How is one atom made to dominate and control innumerable other atoms? and that intelligently but yet without intelligence? Is it not clear that these theories do not carry us forward a single step? that they are not in the least in advance of the naked materialistic Necessarianism a while ago discussed? Is it not equally clear that every attempt to account for intelligent work without prevision of an intelligent principle must prove nugatory, because in conflict with what must ever be accepted as axiomatic truths in all clear elementary thinking?

LIFE-PRINCIPLE.

I assume, then, that there must be an intelligent principle in some way concerned in the process. And suppose we say with DE LA METTRIE: "When people ask whether matter can think, it is as though they asked whether matter can strike the hours;" or with HOLBACH: "Since man, a material being, actually thinks, matter also enjoys the power of

thinking ; " or with MOLESCHOTT : " Thought is a motion of matter ; " or with BUCHNER : " When the clock shows the hours, it is the result of its activity just as thought is the result of the complex machinery of that material tissue which we call the brain ? " how are we better off unless we find a personality in Matter capable of carrying plan and design ? And how does HAECKEL's plastidules help the difficulty ? True he gives them *memory* and *perception*, and if he stopped there it would be well enough ; perhaps this is more than is needed, but he goes on to show that by *memory* and *perception* he means nothing more than certain *modes of motion*. Calling *motion*, *memory* helps out the problem not a particle ; it is simply " darkening counsel ; " it is an attempt to explain the deepest problem in Heredity by rechristening an old and familiar principle, and in this way causing it to take on a new meaning without dropping the old. How does a *branched wave-motion* bear any similitude to *memory* ? how does it carry form and plan and pattern with it ? and, above all, how does it carry with it the intelligent potentiality of wrapping other like *branched wave-motion*, also pregnant with form, plan and pattern, in other germ-cells for countless successive generations. To ask the question is to show the utter inadequacy of the hypothesis.

This principle, whatever it is, is implanted in the germ ; that is, the parent puts into the germ a *something* which enables and causes the germ to grow up on the type and in the form of the ancestor. Now the crucial question is this : What characteristics must that *something* be endowed with to render it capable of causing such growth after the ancestral type ? What potentiality must it carry with it from the parent to the germ ? Is the capacity of compelling growth sufficient ? Certainly not, for growth may be in any direction and after any type. But there must be not only the capacity of compelling growth but growth on particular lines and after a particular pattern. What does this imply ?

Let us take an illustration. You want a country residence built the exact duplicate of your city house. How will you accomplish it? Will you have little stone, and brick, and iron, and glass, and wooden models made, of all the walls, floors, ceilings, doors, windows, stairs, and other parts of your city house, and sent out to mingle with the materials of the new house, expecting these models to cause the new house to take on the form of the old? Will you employ some builder who has never seen your city house, nor met with any description of it, to go out and erect the country house, expecting him to reproduce the former? Or will you take an architect to your residence and have him measure and draw every part of the house, and note the character of every portion of the material of which it is constructed, and then commission him to go and duplicate it? Evidently you will pursue the latter course. Evidently you would never expect any man, nor any power, to reproduce your city dwelling, unless he or it had along the plan of the same in mind, on paper, or in some other form; for evidently no man and no power could ever accomplish it without. To expect otherwise would be to expect impossibilities.

Or suppose you want a watch made after a particular style, how will you proceed? Will you go to a factory and get filings from all the materials used in fabricating a similar watch, from the brass, and steel, and gold, and glass, and jewels, of which it was made; take them and mingle them with other brass, and steel, and gold, and glass, and jewels, expecting that these filings will "carry in their bosoms" the potentiality and knowledge how to compel the materials with which they are mingled to take on the form of the model watch? No, not so long as you have the shadow of reason left. But, on the contrary, you will get some skilled artisan, who carries in his muscles the power, and in his mind the pattern of the model watch, to take your materials and intelligently and purposively so dominate, adjust, and

co-ordinate the physical forces in them, as to compel the shape and action of the other watch.

Carry now these illustrations into Heredity ! A living being forms a germ and places *something* in it with a commission to go and reproduce itself in exact pattern. What is that *something* and how does it carry that commission ? Is it simply a congeries of material atoms and molecules placed in the germ and ordered to build after the original pattern ? Evidently if *only* material, they can no more reproduce the parent form than could the models of the various parts of the city house or the filings from the watch reproduce the original. What then ? See what is necessary to the duplication of the town dwelling or the watch. A *building power* or a watch-making *power* must be commissioned to perform the work and must carry with him a perfect plan of the model to work by. If we would reason with consistency, if we would avoid floundering in a quagmire of contradictory positions, we must admit that the *something* placed in the germ to reproduce the ancestor carries with it a commission, similar to that of the supposed architect or artisan, that it carries with it not only a power to build or make, but a plan of the ancestor to be reproduced. To deny this is to shut down the gates on first principles ; for in all thinking there must be accepted axioms at the bottom. One of these axioms is that no agency can transcend its essential potentiality ; no factor can perform that which is not provided for in its elementary constitution. Now applying this, which must be accepted as a fundamental truth, let us see where we stand. On investigating the phenomena of nature, we find, in the first place, an order of existence which carries with it a capacity for *knowing how*, for filling plans, for shaping ends, for controlling phenomena. The best terms we have for this principle in our language, (though these are inadequate), are Mind or Intelligence. We have another mode of existence, *dead Matter*, which is not, that we can see, endowed with

this principle, which does not know, nor plan, nor carry out plans. But we have still another mode of existence, *living Matter*, wherein there is unceasing adjustment to plan, to pattern, to type. Here we see the attributes of the first-mentioned order of existence, displayed in certain conditions of the second order, giving us a third order, in which are brought together powers and properties which we know separately in the first two orders.

Now how is this accomplished? We have already seen that a parent organism manufactures a germ and places within a principle, a *something*, which compels growth on plan and type. This *something*, then, whatever it may be, carries with it somewhat of the attributes of the first order of existence, of the *knowing principle* we have distinguished, and thus unites the two first orders into a manifestation of the third. Again, therefore, we come back to the inquiry, what is the type-following *something* which the parent wraps in the germ? Is it a material molecule or an assemblage of such, simply? So say MR. DARWIN, PROF. HAECKEL, MR. SPENCER and PROF. WEISMANN. But, if so, then matter must be endowed with the knowing principle which elsewhere we find only in the first order of existence. That is, the doctrine entirely ignores the first order of existence, and assigns its potencies to the second order, only. But mark, it is only the *potentially*, not the *attributes* of the first order that they set off to the second order. They say that material particles can *do the work of intelligence*, but *not* that they *are intelligent*; that *unintelligently they do intelligent work*, just as if one should affirm that a blind man could read an ordinary printed page; and, more than this, that finding there the plan of an intricate piece of machinery, he could go straight to work and reproduce it. Aye, still more, for to make the figure entirely full and just, we must suppose the reader of the page and manufacturer of the machine, not only blind, but entirely *non compos mentis* as well, with

the *power*, however, of fabricating the machine, after the pattern given in the print.

It is as if the architect you sent to build your country residence, and the artisan you commissioned to make your watch, were both blind and idiotic. This is the character of potentiality MR. DARWIN, MR. SPENCER, PROF. WEISMANN and PROF. HAEC-KEL would give to their gemmules, physiological units, plastidules and germ-cells. They give them the potentiality, but not the attributes of intelligence. They deny them intelligence, but give them the capacity of doing intelligent work. If once they should concede intelligence to them, that would be the end of the controversy. If the supposed unit, plastidule, gemmule, or germ-cell follows out the ancestral pattern by reason of knowing or carrying with it the plan, that is all any opponent can ask; at least it is as far as I can claim, for I do not presume to indicate how the parent endows the Life-principle of the germ with the intelligent capacity of building on its own pattern. That it does so is the fact here insisted upon.

ASEXUAL HEREDITY.

Assuming, then, as a demonstrated fact, that the parent organism places within the germ a knowing principle, carrying with it the pattern it is to work by, I shall proceed to consider certain of the prominent phenomena of Heredity, and the manner in which its production must be accounted for on the hypothesis of a *purposive directive principle*.

One of the simplest illustrations of the working of Heredity may be seen in the formation and development of a bud, say of an apple-tree. The bud grows or develops from a cell and there is placed in it, sometime during such growth, a Life-principle carrying with it a plan of the parent tree. This we know, because if severed from the tree, and suitably

transplanted, the bud will grow into a tree like the parent. Now what kind of an existence this *Life*-principle is, or how it holds "within its bosom" a plan of the ancestral tree, I shall not attempt to explain ; but, instead, will try to show how it must be that such plan is followed by it. And having further explained that I shall use such terms as "picture" and "picture-gallery" only figuratively in this connection, I will proceed.

There is, then, in the bud a *Life*-principle placed there by the living tree which knows both the plan or pattern of the parent tree, and, also, how to follow it ; that is to say, an active principle capacitated to know, and furnished with *something* to know ; to wit : the ancestral type. And this *Life*-principle goes to work and unfolds the bud into the grown tree, every step of the way copying the parent tree, at corresponding ages and periods of development, from bud up to maturity. Figuratively, we may say the parent tree endowed the *Life*-principle of the bud with a gallery, hung with pictures of every part of the tree, at every stage of its growth, and with the capacity of noting and copying the same in the bud-development. And this capacity for copying extends to the manufacture of other buds, and placing in them like intelligent *Life*-principles with their patterns.

But the new individual, the developing germ or bud, is dependent for the means of growth on physical substances and forces, such as it may be able to reach and command ; that is to say, on environment ; and as these conditions can never be exactly the same with any two individuals, no two germs can ever have exactly the same material and forces to work with in the building process. And hence, it necessarily happens, that no bud can exactly copy the parent individual ; nor can any two buds from the same tree ever develop into exactly similar individuals. That is to say, continuing the figure, in the parentally furnished gallery are also hung individual

pictures taken from the environment in which growth takes place, and *Life* selects more or less of these, and follows a plan in which these selected ones are composited with the plan furnished by the parental gallery. Hence Variation is a necessary law of hereditary growth.

ATAVISM.

But another principle of vast moment comes in here, that known as Atavism, Reversion, or "harking-back." Frequently it happens that the *Life*-principle follows exactly neither the pattern of the immediate ancestor, nor that pattern modified by sketches furnished by the environment; but, on the contrary, reaches back to the pattern of some one or more remote ancestors, and takes from it or them certain points which it weaves into the new growth; so that the new individual comes to be built on a composite pattern, taken partly from that of the immediate ancestor, partly from that of some one or more of the remote ancestors, and partly from conditions impressed by the environment. But what does this imply? Pursuing our figure, evidently that the parent tree placed in the germ-gallery, not only the pattern and impressions from the environment of its own individuality and life-work; but, also, more or less fully, that of the remote ancestor or ancestors reached back to; and that *Life* guided by unknown laws or considerations, selects from the whole gallery, furnished, as it finds it from these three sources. It may be well to notice here the principle involved in the point of difference between the *Lamarckians* as represented by PROF. COPE and others, and the *Darwinians* as represent by MR. WALLACE, PROF. WEISMANN and others. It is this: the former insist while the latter deny that environment does or can impress itself on the germ so as to cause variation. Another im-

portant question, not yet settled, is whether environment only impresses transmissible conditions on the germ, or whether impressions made on the parent form itself is also transmitted?

SEXUAL HEREDITY.

So far I have considered only a sexual reproduction. But in sexuality other principles of the very greatest importance fall in. Here there can be no development until after the union of two germ-cells (germ-cell and sperm-cell), from the two sexes, into a composite germ-cell, seed or egg. But we must suppose that before such coalescence, each of the parents had placed in the cell furnished by it, a principle of directivity with the plan or pattern of its own being at all stages of development, and also, like patterns from remote ancestors. In the union of the germ-cells there must be a coalescence of the two directivities into a single *Life*-principle; while all the patterns brought by each must be hung in the common gallery; so, that in making its selections, *Life* has before it not only the plans furnished by the environment, but also the individual patterns of the two immediate ancestors, as well as patterns brought down from remote ancestors more or less numerous it may be; or, it may be from the whole of all the lines of ancestry; for whether there be a limitation in the number of generations back, or the number of ancestral lines to which Atavism may run, is not yet determined.

With all these patterns to select and copy from, *Life* mingles selections from both immediate ancestors and often with the same from one or several remote ancestors, in what might seem a very heterogeneous manner; and then all is modified more or less by impressions of the environment; nevertheless, there is never so great a divergence in the new form, but that it clearly appears to be on the parental type. And in the main, the effort seems to be to

develop each germ to the highest standard of the type attainable within the environment.

TERATOLOGY.

But it often happens that *Life* seems to start out on a wrong path, as regards some, or several organs, or functions, and to persistently pursue it, as if a writer should invariably spell certain words backward, or dislocate certain phrases whenever used ; or, as if an arithmetician should invariably use two for three. It is as if, in our figure, certain parts of the several patterns should become transposed and *Life* should work on without perceiving it. Or certain parts may be left out or abridged ; as if in selecting for the composited pattern, *Life* invariably skips over, or passes by certain parts of greater or less moment. And, again, sometimes there are repetitions of parts or organs, as if in working them up, it invariably goes back and repeats itself. Why this should be is not clear, but much light may be thrown upon the obscure subject by studying, what Mr. DARWIN calls the correlation of growth. This is particularly strong in the bilateral symmetry of the higher animals, where usually the corresponding limbs and other homologous appendages of the two sides, correspond closely in size and form. Thus it usually happens that a man's legs or arms are of equal length, and any abridgment from the parental type extends to both of the corresponding limbs. Human beings have been born without arms or without legs and an Irish gentleman is mentioned who was born without either. But sometimes a malformation extends to both limbs on the same side of the body. In the first-mentioned phenomena, evidently the growth of the corresponding limbs is so connected that whatever throws *Life* out, so as to make it vary in the building of one, reaches the other also. But in the latter case, being thrown off from the pattern of one limb, it, as it were, fails to

get back to the normal lines until after it passes the other limb on the same side. This principle is further illustrated in the color of animals. In nearly if not quite all bay horses, the mane, tail, and legs are black. But in sorrel horses the legs are generally, if not always, of the same color as the body, and the mane and tail usually so. That is to say, when *Life* selects sorrel for its body color, it almost always completes the plan by making the legs, mane, and tail of the same color; but if ever it deepens the color of the body to a bay, it goes on to make the legs, mane and tail black. Mr. DARWIN has mentioned many curious correlations of this kind; amongst others that if a dog has any white on it at all, the tip of the tail is invariably white.

The principle may be further illustrated by reference to castrated animals. The bull, for instance, differs from the cow in certain particulars which MR. DARWIN calls secondary sexual characteristics. His body as well as limbs become heavier and stronger, his neck thicker and shorter, his head thicker, his horns shorter and larger, the hair on his head and neck curly, his voice louder and deeper and his courage and belligerency greater. But when castrated young, he grows up into a steer much nearer like the cow in all these particulars. That is, when by a surgical operation *Life* is deprived of the opportunity of perfecting the primary sexual organs, it is thrown out of its accustomed paths all along the line, and drops back on to lines and into patterns much nearer to those of the cow than of the bull. It is as if a weaver should have a thread cut out of his web, showing the same defect in the pattern all the way through the piece.

Malformations frequently consist in a misplacement of parts, *Life* seeming to know how to form them but not where to place them; following the pattern closely in the formation but skipping over in the placing of the part, or organ. Repetition is another form of teratology, as in the not unfrequent

occurrence of a sixth finger or toe with mankind; when, generally as I believe, the repetition is symmetrical with all the limbs; that is to say, *Life* having been in some way induced to repeat itself as to one limb, carries the repetition to the others also. Sometimes repetition and misplacement occur together, that is, a repeated part is placed in unnatural position. Usually, however, in such case the repetition is of some actually produced part of the animal. But I once saw a very singular misplaced repetition from another individual; to wit: a steer with a well formed cow's mammae with teats about three inches long on his right hip. In this case the *Life*-principle placed in the embryo carried with it, of course, the patterns of both parents, and in laying out or selecting the pattern of the bull that was to be got a certain part of the maternal pattern so mixed in with the sexual characters from the paternal side, that it always found it in its working path, and in such an out-of-the-way place that it was built into form on the hip of the young animal. BUCHNER mentions several such monstrosities; as a man with a mammary gland on the shoulder; a woman with three well developed breasts; and men with four instead of two nipples.

So it seems that we may be justified in the theory that *Life* in selecting a composed pattern or plan from the numerous types hung in its gallery, sometimes gets thrown off, or bewildered, as it were, so, that it gets the selections from the different patterns illy arranged; or if properly arranged, then something is liable to occur afterwards to throw it off its normal path, as in the castration of the young ox; or as is generally believed, and no doubt correctly, in injury or fright to the gravid mother.

LAWS OF HEREDITY.

That we may the better trace the working of Heredity, let us suppose a first pair of any species of

beings newly created. Having no ancestry behind them, of course they can place in any germ-cell they may produce only their own life-patterns; and the *Life-principle* of the germ will build up the new individual by compositing from these two patterns; except, as modifications may come from the environment. So that all this second generation can attain to, beyond what is furnished by these two parental patterns, must be received from the environment. It is a type selected and composed from the male and female parents, plus or minus the contributions from the environment.

Two germ-cells from the second generation, uniting to initiate an individual of a third generation, will have placed in the gallery furnished them, the patterns of both the immediate parents which, as has been shown, must have been composed from the patterns of the original pair plus or minus the modifications caused by environment. But in addition, on the principle of Atavism, this third-generation germ must be furnished with the patterns of the first pair also, so that, in the growth of this last germ, its *Life-principle* may select not only from both the immediate parents, but from one or both of the grandparents as well. And observe how this may work. Both the immediate parents may have selected the make-up of some organ from one, say the male grandparent, whereas the grandchild may go back to the female grandparent for the same organ. And, again, the environment leaves its impress on this third generation, as on the second, and so with the next and the next, through all succeeding generations. I think, therefore, that PROF. LECONTE is clearly in error as to the significance he assigns to sexuality: to wit: "the giving to the offspring the tendency to divergent variation" by "funding the individual ancestral differences." The offspring can take nothing from the ancestry but what some of the ancestry had. Environment furnishes the avenues to variation, Heredity the principles of stability; and, sex-

uality by "funding" ancestral differences corrects and modifies the tendencies to variation furnished by environment and tends to keep it within bounds already delimited in the different ancestral lines. So the significance of sexuality in Evolution is the exact reverse of that supposed by PROF. LECONTE. It is the factor which works for the stability of species.

But, going back to the bud, what can be said of this newly-implanted *Life-principle*? What are its powers? its limitations? and its means and manner of workmanship? First it can, of raw earth and air, build a tree after the parent type. On that tree it fashions leaves, and flowers, and fruit; and myriads of buds, like its own first cradle, in each of which it enwraps like *Life-principles*. To do all this it can command, direct, and adjust physical forces, and compel them to take material nutriment, chemically dissolve it, chemically recombine it into various vegetable products, and place these, molecule by molecule, and particle by particle, each in proper place and appropriate form to build, of wood and bark, and leaf and bud and flower, and various "approximate vegetable principles," a tree like the parent tree.

But this is a highly *intelligent process*, and it follows, necessarily, that the actor must be *guided by intelligence*,—that *Life* must itself be an *intelligent principle*, else it could not do this *intelligent work*. But what is the character, extent, and limitations of this intelligence? Evidently, as it uses and commands certain physical forces, it must have an intimate acquaintance with them and the laws of their action and means of their adjustments. As it takes its material stuff from its environment, it must know that environment, and how to use it; and, as it subjects this to chemical decomposition and recombination, it must have thorough knowledge of its chemical character, laws, and reactions. As it patterns the parent tree in all its parts and functions, it must have in mind the ideal of the same.

It seems, then, that it can do just what the *Life* of the parent bud could do, and can empower the individuals of its own progeny to do just the same. This is the general principle, the first great law, no doubt, but it rests under limitations. It cannot *make* either force or matter; it can only use such of either as is presented by the environment. If there be deficient soil, or moisture, or light, or heat, it cannot copy the pattern with exactness; and, if some or all of these elements be in superfluity, it may exaggerate the pattern. Again, if it receives an injury, as a hack from an axe, it can often repair it, knowing how to divert its energies from ordinary work, and directing its forces to concentrate its assimilated matter in proper form and position at the place of the wound.

While each bud of the tree is so far individual and personal, and its *Life*-principle so far independent that, if severed and properly conditioned, it will live, and grow, and become an independent tree, yet, until dissevered, each bud forms a part of a connected whole, and shares in the life functions of the tree. Its *Life* is thus at once a part of the whole *Life* of the tree; and, to a degree, an independent individuality.

So far does this principle extend, that a bud or a whole branch may be taken from one tree and engrafted into another; so that it will there live, and grow, and take part in the common functions of the tree; while, at the same time, so far maintaining its own individuality, as to perfect its own manner of leaf and fruit, not only in form and size, but in color, consistency, odor, taste, and constituency, as well.

From these considerations the following laws of Heredity may be laid down:

1. Heredity originates nothing. It only perpetuates or recalls what it finds already existing somewhere along the line of the ancestry.

2. Varying environment tends to cause a variation of individual type in each successive generation.

3. The principle of Atavism, by recalling earlier ancestral types, tends to stability of species. It

counteracts the tendency to variation impressed by environment.

4. The individual is built upon a composited pattern, selected from the types furnished from the immediate ancestors, the remote ancestors, and the environment.

5. All this is accomplished by an intelligent *vital* or *Life-principle*, placed within the germ by the parent being, and furnished with its own life-history, as well as that of remote ancestors.

6. In sexual reproduction, such life-history is furnished by each of the parents, together with the same of remote ancestors of all lines.

7. These are blended with pictures from the environment, and from all these, *Life* selects and composites its own material form on the general parental type.

8. Sometimes, in a manner not yet understood, *Life* gets its patterns mixed, or disarranged so that it abbreviates, repeats or misplaces certain parts in building up the individual. This often occurs with strict attention to homology of parts.

9. Until severed from the parent form, the *Life* of the germ may be, at the same time, an individual capable of independent being, and an active factor in the parent being.

10. Each *Life-principle* placed within a germ, carries the capacity of multiplying itself indefinitely by placing other like *Life-principle* in other germs, in continuous succession, through all future generations.

The doctrine here outlined differs from that promulgated by M. LAMARCK in two important particulars. In the first place, while both theories admit that environment influences Heredity, the explanation given of the cause of the phenomena, as well as of the *modus operandi* of its action in the two doctrines, are exactly the converse of each other. The Lamarckian theory holds that the physical forces of the environment act unintelligently upon the physical

organism, inducing or exciting reaction in unintelligent forces resident therein, either directly or by inciting the conscious will to endeavor and action; which reactions eventuate in a modification of the organism to correspond with the environment; and, further, that such modified condition of the organism is transmitted by Heredity, through some necessary law of unknown derivation and obligation. On the contrary, the theory here advocated maintains that the *modification is caused by the intelligent activity of an interior vital principle, working to fit the organism to the conditions.*

The other difference is this: LAMARCK's fourth law declares: "All that has been acquired, impressed, or altered in the organization of individuals during the course of their life is preserved by generation, and transmitted to the new individuals which spring from those who have experienced these changes;" while it is here contended, that a part only of the modifications imposed by environment, are transmitted; that *Life selects* what it will copy from any source, on principles entirely unknown, and only what it copies is transmitted.

The difference between the *Lamarckian* and *Darwinian* theories is this: In the former the transmitted variations are caused by the action or impress of the environment on the organism; while in the latter, they are produced by unknown causes acting wholly independent and irrespective of the environment, so that their effects are entirely casual, so far as any relations to the conditions of growth are concerned. However, PROF. CHARLES F. PEIRCE goes farther than this, and makes the variations underlying *Darwinian* Heredity *absolutely fortuitous*; not even depending them upon unknown causes. On the other hand, PROF. WEISSMAN makes them the results of fixed, but intelligent tendencies to variation imbedded in the very constitution of the organisms, and acting without other cause, law, incitement, or reason.

CHAPTER VI.

LIFE.

In all bodies, both living and non-living, two orders of existence, Matter and Force, are always present; and the great question now facing us is whether, as I have all along argued, there be in living bodies a third order of existence whose presence compels the lines of distinction between the living and the non-living, or whether the living is simply an advanced or varied exhibition of the principles always present in the non-living. In other words, whether we have to do with a third and diverse principle, or only some element inherent in Matter or Force.

It is necessary, therefore, that the discussion shall be preceded by some investigations into the nature of Life. This can best be done by first giving the earliest phenomena or lowest processes of life, so far as biologists have yet been able to trace them out, and then by noting the most salient distinctions between living and non-living matter.

FIRST LIFE FORMS.

With remarkable lucidity, Prof. ALLMAN thus sets forth the character of the lowest forms of life:

"Wherein there is life, from its lowest to its highest manifestations, there is protoplasm; wherein there is protoplasm, there, too, is life. . . . Protoplasm is essentially a combination of albuminoid bodies, and its principal elements are, therefore, oxygen, carbon, hydrogen, and nitrogen. In its typical state it presents the condition of a semi-fluid substance—a tenacious, glairy liquid, with a consistence somewhat like that of the white of an unboiled egg. While we watch it beneath the microscope, movements are set up in it;

waves traverse its surface, or it may be seen to flow away in streams, either broad and attaining but a slight distance from the main mass, or else stretching away far from their source, as narrow liquid threads, which may continue simple or may divide into branches, each following its own independent course; or the streams may flow one into the other, as streamlets would flow into rivulets and rivulets into rivers, and this not only where gravity would carry them, but in a direction diametrically opposed to gravitation: now we see it spreading itself out on all sides into a thin liquid stratum, and again drawing itself together within the narrow limits which had at first confined it—and all this without any obvious impulse from without which would send the ripples over its surface or set the streams flowing from its margin. Though it is certain that all these phenomena are in response to some stimulus exerted on it by the outer world, they are such as we never meet with in a simply physical fluid: they are spontaneous movements resulting from its proper irritability, from its essential constitution as living matter.

"Examine it closer, bring to bear on it the highest powers of your microscope; you will probably find disseminated through it countless multitudes of exceedingly minute granules; but you may also find it absolutely homogeneous, and, whether containing granules or not, it is certain you will find nothing to which the term *organization* can be applied.

"And yet no one who contemplates this spontaneously moving matter can deny that it is alive. Liquid as it is, it is a living liquid; organless and structureless as it is, it manifests the essential phenomena of life."

Again: "Haeckel has found inhabiting the fresh waters in the neighborhood of Jena minute lumps of protoplasm which when placed under the microscope were seen to have no constant shape, their outline being in a state of perpetual change, caused by the protrusion from various parts of their surface of

broad lobes and thick, finger-like projections, which, after remaining visible for a time, would be withdrawn, to make their appearance again on some other part of the surface.

"These changeable protrusions of its substance, without fixed position or definite form, are eminently characteristic of protoplasm in some of its simplest conditions. They have been termed 'Pseudopodia.'

"To the little protoplasmic lumps thus constituted Haeckel has given the name of *Protomæba primitiva*. He has seen them multiplying themselves by spontaneous division into two pieces, which, on becoming independent, increase in size and acquire all the characters of the parent.

"But we must now pass to a stage a little higher in the development of protoplasmic beings. Widely distributed in the fresh and salt waters of Britain, and probably of almost all parts of the world, are small particles of protoplasm closely resembling the *Protomæba* just described. Like it, they have no definite shape, and are perpetually changing their form, throwing out and drawing in thick lobes and finger-like pseudopodia, in which their body seems to flow away over the field of the microscope. They are no longer, however, the homogeneous particles of protoplasm which form the body of the *Protomæba*. Toward the centre a small globular mass of firmer protoplasm has become differentiated off from the remainder, and forms what is known as a nucleus, while the protoplasm forming the extreme outer boundary differs slightly from the rest, being more transparent, destitute of granules, and apparently somewhat firmer than the interior. We may also notice that at one spot a clear spherical space has made its appearance, but that while we watch it it has suddenly contracted and vanished, and after a few seconds has begun to dilate so as to again come into view, once more to disappear, then again to return, and all this in regular rhythmical sequence. This little rhythmically pulsating cavity is called the 'contractile vacuole.'

"We have now before us a being which has arrested the attention of naturalists almost from the commencement of microscopical observation. It is the famous *Amaeba*.

"Like all living beings, it must be nourished. It cannot grow as a crystal would grow by accumulating on its surface molecule after molecule of matter. It must feed. It must take into its substance the necessary nutriment, it must assimilate this nutriment, and convert it into the material of which it is itself composed.

"If we seek, however, for a mouth by which the nutriment can enter into its body, or a stomach by which the nutriment can be digested, we seek in vain, yet watch it a moment as it lies in a drop of water beneath our microscope. Some living denizen of the same drop is in its neighborhood, and its presence exerts on the protoplasm of the *Amaeba* a special stimulus, which gives rise to the movements necessary for the prehension of nutriment. A stream of protoplasm instantly runs away from the body of the *Amaeba* toward the destined prey, envelops it in its current, and then flows back with it to the central protoplasm, where it sinks deeper and deeper into the soft, yielding mass, and becomes dissolved, digested, and assimilated in order that it may increase the size and restore the energy of its captor.

"But again, like all living things *Amaeba* must multiply itself; and so after attaining a certain size its nucleus divides into two halves, and then the surrounding protoplasm becomes similarly cleft, each half containing one half of the original nucleus. The two new nucleated masses which thus arise now lead an independent life, assimilate nutriment, and attain the size and character of the parent.

"In the body of the *Amaeba* we have the type of a cell. Now both the fresh waters and the sea contain many living beings besides *Amaeba* which never pass beyond the condition of a simple cell.

"In every one of these cases the entire body has the

morphological value of a cell, and in this simple cell reside the whole of the properties which manifest themselves in the vital phenomena of the organism.

"But organization does not long rest on this low stage of unicellular simplicity, for as we pass from these lowest forms into higher we find cell added to cell until many millions of such units become associated in a single organism, when each cell, or each group of cells, has its own special work, while all combine for the welfare and unity of the whole.

"In the most complex animals, however, even in man himself, the component cells, notwithstanding their frequent modification and the usual intimacy of their union, are far from losing their individuality. Examine under the microscope a drop of blood freshly taken from the human subject, or from any of the higher animals. It is seen to be composed of a multitude of red corpuscles swimming in a nearly colorless liquid, and along with these, but in much smaller numbers, somewhat larger colorless corpuscles. The red corpuscles are modified cells, while the colorless corpuscles are cells retaining their typical form and properties. These last are little masses of protoplasm, each enveloping a central nucleus. Watch them. They will be seen to change their shape—they will project and withdraw pseudopodia, and creep about like an *Amœba*. But more than this—like an *Amœba* they will take in solid matter as nutriment. They may be fed with colored food, which will then be seen to have accumulated in the interior of their soft, transparent protoplasm, and in some cases the colorless blood-corpuscles have actually been seen to devour their more diminutive companions, the red ones.

"But it is not alone in such loosely aggregated cells as those of the blood that there exists an independence. The whole complex organism is a society of cells, in which every individual cell possesses an independence, an autonomy, not at once so obvious as in the blood cells, but not in the least less real. With this

autonomy of each element there is at the same time a subordination of each to the whole, thus establishing a unity in the entire organism, and a concert and harmony between all the phenomena of its life.

"In this society of cells each has its own work to perform, and the life of the organism is made up of the lives of the component cells.

"We have hitherto considered the cell only as a mass of active nucleated protoplasm, either absolutely naked or partially enclosed by a protective case, which still permits free contact of the protoplasm with the surrounding medium. In very many instances, however, the protoplasm becomes confined within resisting walls, which entirely shut it in from all direct contact with the medium which surrounds it. With the plant this is almost always so after the earliest stages of its life. There the protoplasm of the cells is endowed with the faculty of secreting over its surface a firm, resisting membrane of cellulose, a substance destitute of nitrogen, thus totally different from the contained protoplasm, and incapable of manifesting any of the phenomena of life.

"Within the walls of cellulose the protoplasm is now closely imprisoned, but we are not on that account to suppose that it has lost its activity, or has abandoned its work as a living being. Though it is now no longer in contact with the surrounding medium, it is not the less dependent on it, and the reaction between the imprisoned and the outer world is still permitted by the permeability of the surrounding wall of cellulose. We have abundance of facts to show that the imprisoned protoplasm loses none of its activity." *Inaugural Address at the British Association at Sheffield in 1879.*

Prof. HAECKEL says: "During late years we have become acquainted with *Monera*, organisms which are, in fact, not composed of any organs at all, but consist entirely of shapeless, simple, homogeneous matter. The entire body of one of these *Monera*, during life, is nothing more than a shapeless, mobile, little lump

of mucus or slime, consisting of an albuminous combination of carbon. Simpler or more imperfect organisms we cannot possibly conceive.

“In a state of rest most Monera appear as small globules of mucus or slime, invisible, or nearly so, to the naked eye; they are at most as large as a pin’s head. When the Moneron moves itself there are formed on the upper surface of the little mucus-globule shapeless, finger-like processes, or very fine radiated threads: these are the so-called false feet or pseudopodia. The false feet are simple, direct continuations of the shapeless albuminous mass, of which the whole body consists. We are unable to perceive different parts in it, and we can give a direct proof of the absolute simplicity of the semi-fluid mass of albumen, for with the aid of the microscope we can follow the Moneron as it takes in nourishment—for instance, small particles of decayed organic bodies or microscopic plants and infusoria accidentally come into contact with the Moneron; they remain hanging to the sticky semi-fluid globule of mucus, and here create an irritation which is followed by a strong afflux of the mucus-substance, and, in consequence, they become finally completely inclosed by it, or are drawn into the body of the Moneron by displacement of the several albuminous particles, and are there digested, being absorbed by simple diffusion (endosmosis).” (*History of Creation*, pp. 183–186 vol ii).

ATTRIBUTES OF LIVING MATTER.

From the characteristics of lowest life may be gathered the following traits which distinguish living from non-living matter:

(1) Living beings *feed*; that is, they take in foreign bodies of unlike constitution and chemical composition to themselves, analyze them into their chemical constituents, and recombine them into new substances

for use. Non-living matter presents no processes like this.

(2) Living bodies *breathe*. That is, they take in gaseons matter from the atmosphere, which they combine with nntrient matters into new prdncts, while in tnrn exhaling other refuse gaseous matter. Non-living bodies carry on no such processes.

(3) Living beings *grow* by additions made *from within* on all their parts, both internal and external, of digested matter assimilated to the consistency, nature, and need of each varied organ, function, and part. When non-living bodies grow, it is through the external accretion of matter of the same chemical character and constitution without any preparation similar to digestion and assimilation.

(4) Living bodies *propagate* their kind by segregating minute particles of their own substance to feed and grow up on the parental pattern. And although no physical or chemical difference can be discerned in the germs of widely different species, each, nevertheless, always develops trne to its kind.

Says DR. BEALE: "Here are two minute masses of perfectly *structureless, colorless*, living matter. No difference between them can be demonstrated by physics or chemistry. They have no structure. They are soft and diffuent. One placed under certain conditions will become a dog, the other a man; but from the dog-germ you cannot by any alteration of conditions obtain a man, any more than from the man-germ anything but a man, or parts of a man, can be evolved. Now what is the difference between the man-living-matter and the dog-living-matter which could not be distinguished by physical or chemical investigation? I would answer, a transcendent difference—but in *power*." (*Mystery of Life*, p. 13.)

(5) Living matter, excepting perhaps the very lowest forms, is *organized*; that is, it possesses reciprocal parts or organs whose processes mutnally complement and aid each other. But non-living matter is not organized. It does not present reciprocal and

dependent parts. The nearest approach to it in nature, perhaps, may be seen in the Solar System, where the planets are driven towards the sun by gravitation in such manner as to produce orbital motion. In this case, although the existence of the sun is a necessity to the present constitution of the planets, it is not seen that, reciprocally, the presence and motions of the planets are necessary or advantageous to the sun.

Perhaps a man-made machine may be called an organism. It is made up of pieces or parts adjusted and placed by intelligent will. But this is the very thing denied by Materialists to living bodies. They say that living matter is not the product of purposive will. Such being their contention, they are logically cut off from resorting to human contrivances for standards of comparison with living organisms.

(6) Living bodies possess an *activity referable to an internal centre or source*. This is well set forth in the descriptions of Protoplasm and Monera quoted; and dead or non-living matter exhibits nothing analogous. All matter is susceptible to the action of pressure-force, and liable to motion over the line of the resultant of all the tendencies to motion to which it is subject, according to the law of the Parallelogram; but this is something of an entirely different character from the motions of living bodies. Indeed, a very great part of the processes of life are carried out in apparent direct opposition to the ordinary physical forces of non-living matter.

Quoting from Dr. BEALE again: "We demonstrate some transparent stuff which takes from around it certain matters dissolved in the water in which it lives, and converts these into stuff like itself. How? 'By its molecular machinery, worked by its molecular forces,' answers the force philosophy. It moves, and different portions of the little piece move in opposite directions at the very same instant. What makes it move? 'Its molecular machinery, by the laws of molecular physics,' we are told. . . . How are the forces conditioned? What is the structure of the

supposed force-conditioning machinery, and how did it make itself? No answer but, 'future investigation will decide.' But at this time we demonstrate, by our own observation, that the stuff that moves is clear, transparent, and, under a power of five diameters, perfectly structureless. We can see no machinery, and we know that there is no machinery in the living matter at all like any machinery known to us, or in any way tending to approach it in character. If, therefore, the term 'machinery' is to be applied to this transparent matter, the word has had a new meaning assigned to it. . . . This clear, transparent, structureless living stuff came from stuff like itself, which had similar powers and properties." (*Mystery of Life*, p. 18.)

And again: "One characteristic of every kind of living matter is spontaneous movement. This, unlike the movement of any kind of non-living matter yet discovered, occurs in all directions, and seems to depend upon changes in the matter itself rather than upon impulses communicated to the particles from without.

"I have been able to watch the movements of small *amæbæ*, which multiplied freely without first reaching the size of the ordinary individuals. . . . Several of these were less than $\frac{1}{10000}$ th of an inch in diameter, and yet were in a state of most active movement. The alteration in form was very rapid, and the different tints in the different parts of the moving mass, resulting from alterations in thickness, were most distinctly observed. The living bodies might, in fact, be described as consisting of minute portions of very transparent material, exhibiting the most active movements in various directions in every part, and capable of absorbing nutrient materials from the surrounding medium. A portion which was at one moment at the lowest point of the mass would pass in an instant to the highest part. In these movements one part seemed, as it were, to pass through other parts, while the whole mass moved, now in one, now in an-

other direction, and movements in different parts of the mass occurred in directions different from that in which the whole was moving. . . .

"The movements above described continue as long as the external conditions remain favorable; but if these alter, and the amœbæ be exposed to the influence of unfavorable circumstances,—as altered pabulum, cold, etc.,—the movements become very slow, and then cease altogether. The organism becomes spherical, and the trace of soft formed material upon the surface increases until a firm protective covering, envelope, or cell-wall results. In this way the life of the germinal matter is preserved until the return of favorable conditions, when the living matter emerges from its prison, grows, and soon gives rise to a colony of new amœbæ, which exhibit the characteristic movements of Protoplasm." (*Ibid.*) .

(7) Living bodies have *irritability, sensation, or feeling*; and the higher organisms have intelligence, consciousness, and will, none of which are exhibited by non-living matter.

Prof. ANDREW WILSON says: "Nor is it less important to note how the simple acts of sensation in the amœbæ are performed similarly by means which appear all inadequate for their performance. That which distinguishes the animalcule most conclusively from the great majority of its plant-neighbors is this power of receiving sensations and of acting upon them. But for this power the animalcule would be essentially in the position of an inorganic or lifeless mass. A solid particle floating about in the miniature sea which contains the amœba and its neighbors impinges upon the soft protoplasm of its body. Upon such a stimulus, the protoplasm, as we have seen, contracts, and the food particle is duly surrounded and ingulfed by the living mass of the animalcule. . . . Sensation is thus unquestionably present in this low form of life.

"Its protoplasm not only receives sensations: it is also able to act upon information received." (*Evolution*, p. 66.)

(8) Living bodies *control and co-ordinate* natural physical forces. This proposition is conclusively shown by the facts that every living body is subject to the action of all the natural forces the same as the non-living, and that every action of living matter is in opposition to some one or more of said forces and in co-ordination with others. The bird, in rising in the air, overcomes the gravity of its own body by co-ordinating the pressure-force produced by the contractions of its muscles with the gravity of the atmosphere.

(9) Living bodies *resist tendencies to chemical combinations and dissolutions*. This is a fact too familiar to need illustration.

(10) Living beings possess the capacity, to a greater or less degree, of *restoring lost parts*. A watch cannot do this. If the minutest cog in a wheel be broken, the watch cannot repair the damage nor supply a new part. Neither can we conceive of the Solar System supplying a new planet in the place of one which might be lost.

However, a crystal will, under favorable conditions, repair a mutilation ; or, rather, it will suffer such repair, for the crystal is altogether passive in the process while all the activity is in the environing matter, the molecules of which move into the appropriate positions to fill out the geometric figure of the crystal.

But in living matter it is the living body itself which is active and places digested and assimilated matter in position to replace the lost parts. Some animals will readily replace whole limbs, the crawfish will reproduce a lost eye, and man himself will repair broken bones and heal wounds in various tissues. But as shown, the process through which this is done is altogether different from that through which the mutilated crystal is repaired. And it is not seen that there is anything gained in scientific precision by insisting on classing the two diverse processes under one term.

(11) Living matter *dies*. It loses all its distinctive properties and becomes non-living. Non-living mat-

ter may suffer dissolution, but it cannot die. The crystal may be dissolved by heat or moisture, but the same matter will always recrystallize when the surplus heat or moisture is withdrawn. The watch may be taken to pieces. It may *die* in the sense of the term as used by *Mr. Hinton's Chinee*, but when the parts are put back in place it will live again, and this experiment may be repeated thousands of times. So it is not difficult to conceive that sufficient physical power might take the Solar System to pieces, and thus let it *die* in the same sense, and then putting the orbs back in place, cause it to *live* again.

But when a living being is dissolved or taken to pieces, it dies a death that no human skill, nor any physical power with which we are acquainted, can visit with resurrection. It does not, and so far as Science knows, cannot live again.

INTELLIGENT LIFE-PRINCIPLE.

This brings us to the discussion of the great question at issue in biology—whether or not the next difference asserted to exist between living and non-living matter is real or imaginary. The proposition is thus stated:

(12) *Living bodies exhibit in the processes of their construction the handiwork of an interior, individual, purposive intelligence.*

This proposition is denied, of course, by all those biologists who take a mechanical view of life,—indeed, the purposive theory and the mechanical theory of Life are exact opposites, and the one cannot stand without an entire displacement of the other.

Prof. FISKE says: “The development of living matter is but a specialized portion of the whole development of the earth, and it is only for reasons of convenience that the formation of primeval protoplasm is assigned to a different science from that which deals with the formation of limestone or silica” (*Cosmic Philosophy*, v. i. p. 435). “Dynamically, the only difference between carbonate of ammonia and proto-

plasm which can be called fundamental is the greater molecular complexity and consequent instability of the latter" (*Ibid.* 433). "I am not disposed to deny that the shape of a bacterium, or indeed of a wasp, a fish, a dog, or a man, is due, quite as much as a crystal of snow or quartz, to the forces mutually exerted on each other by its constituent molecules" (*Ibid.* 429). "The difference between a living and a non-living body is seen to be a difference of degree, not of kind,—a difference dependent solely on the far greater molecular complexity of the former....Instead of a difference in kind between life and not-life, we get only a difference of degree" (*Ibid.* 432).

Says GEORGE J. ROMANES: "To me it has always appeared that, with reference to this question, organic nature cannot be logically separated from inorganic. No doubt the adaptations which are to be met with in the former are more numerous and more suggestive of rational intention than are the adaptations which are to be met with in the latter; but forasmuch as all nature is one system, it is as true that physical conditions are adapted to organisms as it is that organisms are adapted to physical conditions; and it is likewise true that every part of the physical universe is adjusted with reference to other parts, in a manner precisely analogous to that in which the various parts of the organic universe are adjusted. That is to say, the adjustments everywhere appear to consist in an exhibition of the principles of mechanism; and although this exhibition attains much the highest level of intricacy in the organic world, on the other hand, in the inorganic world it displays a much greater wonder of magnitude; so that, with reference to the question of design, we may doubt whether one department really represents any better kind or degree of evidence than the other." (*Fortnightly Review.* (*Library Mag.*, Sept. 1885.)

Mr. JAMES HINTON says: "The animal body, so far, answers exactly to a machine such as we ourselves construct. In various mechanical structures, adapted to work in certain ways, we accumulate or store up

force. We render vapor tense in a steam-engine; we raise weights in the clock; we compress the atmosphere in the air-gunn; and, having done this, we know that there is a source of power within them from which the desired action will ensue. The principle is the same in the animal functions: the source of power in the body is the storing up of force.

"But in what way is force stored up in the body? It is stored up by resistance to chemical affinity.

"We inquire, then, why the living body has in itself the power of acting, and is not like the inert mass of merely inorganic matter? And here let us observe that some other things besides the animal body possess an active power. 'It died last night!' exclaimed the Chinaman, in triumph, on selling the first watch he had ever seen. And certainly a watch is like an animal in some respects. Under certain conditions it has an active power as like that of the heart as could readily be devised. What are those conditions? They are very simple. It must contain a spring in a state of tension; that is, force must have been applied to it in such a way as to store up power, by opposing the tendency of the metal to straighten itself. Let us fix in our minds this conception of tension or balancing of two forces in the watch-spring. The power applied in winding it up is exerted in opposing the elasticity of the steel: it is compressed—coerced. The production of motion from it, when in this state, is a quite simple mechanical problem: let it unbend, and let wheels and levers be at hand to convey the force when it may be desired."

Prof. HAECKEL says: "If we designate the growth and formation of organisms as a process of life, we may with equal reason apply the same terms to the developing crystal. The teleological conception of nature, which looks upon organisms as machines of creation, arranged for a definite purpose, must logically acknowledge the same also in regard to the forms of crystals. The differences which exist between the simplest organic individuals and inorganic

crystals are determined by the solid state or aggregations of the latter and by the semi-fluid state of the former. Beyond that, the causes producing form are exactly the same in both. This conviction forces itself upon us most clearly if we compare the exceedingly remarkable phenomena of growth, adaptation, and the correlation of parts of developing crystals with the corresponding phenomena of the simplest organic individuals (Monera and cells). The analogy between the two is so great that in reality no accurate boundary can be drawn" (*History of Creation*, vol. i. p. 337). And again: "The only difference between the growth of the crystal and that of the simplest organic individual, the cell, is that the former adds the new substance externally, while the latter absorbs it internally." (*Evolution of Man*, vol. i. p. 156.)

Mr. SPENCER says: "The essential community of nature between organic growth and inorganic growth is, however, most clearly seen on observing that they both result in the same way. The deposit of a crystal from a solution is a differentiation of the previously mixed atoms—an integration of one class of atoms into a solid body and the other class into a liquid solvent. Is not the growth of an organism substantially a similar process?" (*Biology*, vol. i. p. 107.)

Again: "Is not the growth of an organism substantially a similar process to the growth of a crystal?"

Again: "The ability of an organ to recomplete itself when one of its parts has been broken off—as in the growth of a lizard's leg after amputation, or in the development of a begonia from a leaf fragment—is of the same order as the ability of a broken crystal to recomplete itself. For this property there is no fit term. If we substitute for the cirenitous expression, the power which certain units have of arranging themselves into a special form, we may, without assuming anything more than is proved, use the term organic polarity, or polarity of the organic units, to signify the proximate cause of the ability which or-

ganisms display of reproducing lost parts." (*Epitome of Synthetic Philosophy*, p. 88.)

Prof. TYNDALL says: "Supposing the molecules of the human body, instead of replacing others, and thus renewing a pre-existing form, to be gathered first-hand from nature and placed in the exact relative positions which they occupy in the body. Supposing them to have the same forces and distribution of forces, the same motions and distribution of motions,—would this organized concourse of molecules stand before us as a sentient, thinking being? There seems no valid reason to assume that it would not. Or, supposing a planet carved from the sun set spinning round an axis, and sent revolving round the sun at a distance equal to that of the earth, would one consequence of the refrigeration of the mass be the development of organic forms? I lean to the affirmative."

Prof. HUXLEY says: "A mass of living protoplasm is simply a molecular machine of great complexity, the total results of the working of which, or its vital phenomena, depend, on the one hand, upon its construction, and, on the other, to the energy supplied to it; and to speak of 'vitality' as anything but the name of a series of operations is as if one should talk of the 'horology' of a clock." And yet Prof. Huxley strangely contradicts himself. Speaking of a drop of protoplasm, he says: "Strange possibilities lie dormant in that semi-fluid globule. Let a moderate supply of warmth reach its warm cradle, and the plastic matter undergoes changes so rapid and yet so steady and purpose-like in their succession, that one can only compare them to those operated by a skilled modeller upon a formless lump of clay. As with an invisible trowel the mass is divided and subdivided into smaller and smaller portions, until it is reduced to an aggregation of granules not too large to build, withal, the finest fabrics of the nascent organism. And then it is as if a delicate finger traced out the line to be occupied by the spinal column and moulded

the contour of the body, pinching up the head at one end, the tail at the other, and fashioning flank and limb into due proportions in so artistic a way that, after watching the process hour by hour, one is almost involuntarily possessed by the notion that some more subtle aid to vision than an achromatic would show the hidden artist with his plan before him striving with skilful manipulation to perfect his work" (*Lay Sermons*, p. 261). And yet he makes all that "but the name of a series of operations," like "the horology of a clock!"

But Prof. ANDREW WILSON draws the correct distinction : "Growth and increase are truly represented in the organic world ; but these processes are different in kind from the actions which stamp the development of the animal or plant. The birth of a crystal, although regulated by definite laws, is, after all, a matter of outside regulation alone, and one in which the crystal itself is but a passive agent. New particles are added to the outside surfaces of the old and already formed particles ; and crystal and stalactite thus grow mechanically and by accretion, but without active participation in the work destined to mould and form their substance." (*Evolution*, p. 167.)

Prof. ALLMAN, speaking of the Monera, has already been quoted : "Like all living beings, it must be nourished. It cannot grow as a crystal would grow by accumulation on its surface molecule after molecule of matter. It must feed. It must take into its substance the necessary nutriment ; it must assimilate this nutriment, and convert it into the material of which it is itself composed."

Several of the differences noted between living and non-living matter are so obvious that they must be admitted by all. That living bodies *Feed, Grow from additions made internally, Propagate their kind, possess an Activity referable to internal sources, Have irritability, sensation or feeling, Die* ; and that all of the higher grades are *organized*, while non-living matter possesses none of these properties,—are facts

that none can deny, however they may attempt to explain them. But it remains, in the first instance, to be seen if these differences are only "of degree, and not of kind," as asserted by Prof. FISKE.

Noticing the first differences, that living beings *feed* and *breathe*, while the non-living do not, it seems very strange that so eminent a scientist as Prof. FISKE can say that there is *not* here a difference in *kind*. Living bodies take inside of them extraneous material, dissolve it when solid, and, whether taken solid or liquid, chemically analyze it into its elements, and then recombine these elements alone or else with others taken from the atmosphere in breathing into molecules of innumerable classes or kinds, differing from each other, and from the digested food in various chemical and physical properties; and then these molecules are used when, and where, and in such manner as needed in restoring the waste and supplying the growth of the various organic structures of the living being. Now, absolutely, it has never been shown, it cannot be shown, where any non-living matter thus feeds, or thus decomposes nutriment, or thus recombines the elements into the molecules of "approximate principles," or of any similar bodies. And what say these most distinguished biologists quoted a few pages back? They *assert* that there is no difference between living and non-living matter; no difference in principle between the growth of a living body and the growth of a crystal; no difference between a living body itself and a machine made by human hands. They *assert*, and that is all:—Prof. FISKE, that "between a living and a non-living body is seen to be a difference of degree, not of kind," Mr. ROMANES, that "organic nature cannot be logically separated from inorganic;" Mr. HINTON, that "the animal body answers exactly to a machine such as we ourselves construct;" Prof. HAECKEL, that "the causes producing form are exactly the same in both;" Mr. SPENCER, that "both result in the same way;" and Prof. HUXLEY, that "a mass of protoplasm is simply a molecular machine of great complexity."

They assert, but what more do they? Have they anywhere shown, in a single instance, that non-living bodies feed and breathe with the incident and dependent phenomena of digestion and assimilation, which may be described as the tearing down and breaking up of the materials eaten and breathed into their integral elements, and the rebuilding of them into molecules of the innumerable classes and characters needed in the construction of the various organs and in carrying on the various functions of Life? Again, it is affirmed that they have not. Again, it is affirmed that here is a difference between living and non-living matter as broad and significant as it is possible to frame language or thought to express. What, then, does assertion amount to? No one doubts the ability, the learning, or the candor of these great men. But for some reason they have failed to analyze the question down to first principles so as to bring to light the differences so remarkably diverse and obvious to all who do thus dig down to bottom conditions.

Dr. PAUL CARUS very truly remarks: "We must here add, that Mr. Spencer and his disciples overvalue the importance of generalization. It is not the power of generalization that makes the philosopher and the scientist, but the power of *discrimination*. The habit of generalizing whatever comes under our observation is very common among the uneducated and uncivilized, and almost nine-tenths of human errors arise from unwarranted generalizations." (*Open Court*, 2494.)

Crystals are passive in growth; they exert no activity in the process; they do not make over or prepare the molecules added to their masses; they grow from accretion on the outside; they grow by the accumulation on their surfaces of already formed molecules of the same chemical and physical characters as their constituent materials. The growth of a living body is a reverse process throughout. It is active in feeding and other processes. It grows from the interior. It grows by assimilation—that is, by

manufacturing molecules similar to the substance of all its various organs, and then setting them in place as needed ; by taking to pieces molecules unlike its own substance, and building them into similar form and character thereto before using them.

No one can deny that these differences exist as here set forth. No one who has adequately weighed them can doubt that they are radical, both broad and deep. Why, then, should they be ignored or glossed over ? Why should it be claimed that they are only two degrees or grades of one process ? Is obliviousness to such wide and uncompromising distinctions promotive of scientific or philosophic accuracy and verity ? or is it not a darkening of counsel rather—a shutting out of light and knowledge ?

If any difference, the next distinction is more marked and obtrusive yet. Living beings propagate by maturing and setting off germs which grow into the full parental type. No materialistic biologist can dare claim that there is anything, anywhere, in anywise, analogous or approaching to this process in non-living matter. Even the much-used crystal utterly fails them here. The crystal never buds nor otherwise puts out germs which grow into independent mature individuals like the original. Also in all living bodies we have a principle, heredity, and in all but the lowest another principle, sexuality, both intimately connected with propagation, and both utterly unknown to non-living matter.

Nothing in all the inorganic world has sexuality, heredity, or fecundity. All living beings possess the two latter properties, and all the higher modes the former. With such broad distinctions staring one in the face, is it consonant to reason to say there is *no* difference in *kind*, but *only in degree* ?

A broken crystal, properly conditioned, will have the loss repaired by the flowing to and accretion upon the mutilated surface, of particles of surrounding soluble matter, homogeneous with its own molecular substance. But as in its ordinary growth the crystal is entirely passive during the process of deposition from the sur-

rounding media, the molecules, by some force inherent in them, as yet but dimly understood, leave the liquid of the solution, move into place, and attach themselves to the surface of the crystal.

But when the living being would restore a mutilated limb, repair a broken bone, or heal a wounded or abraded surface, it feeds, it digests, it assimilates; that is, it takes nutriment into its interior, where it breaks it up into elementary particles, rebuilds these into such molecules as limbs, or bones, or flesh, or skin are made of, and then carries and places each in proper place to mend the breach. This difference is precisely analogous to that explained in growth, and we may repeat the inquiry: Can any distinction possibly be deeper or broader or more pronounced than this?

The illustrations heretofore quoted from Prof. ALLMAN and Prof. WILSON show that the lowest of living matter has irritability and sensation; and these are but names for the lowest modes of intelligence. No dead matter has any degree of this property. The very lowest living body shows something of intelligence. A crystal, a stoue, a table, a pitcher of water, a log of wood, a dead human body, exhibits none, not even the faintest sign of intelligence. Here is a distinction clearly drawn, and of immense significance. How can a being with even the slightest degree of intelligence, like the microscopic protoplasm, be rated in the same order of existence with the utterly unintelligent, such as chips from the mason's hammer?

All living beings possess some degree of activity referable to an internal store or source. They possess some degree of inherent self-activity. All dead matter is entirely passive. It has no store or source of native activity. A stone or a billet of wood never manifests activity except as driven or controlled by external forces which may impinge upon it.

Living bodies control and co-ordinate natural physical forces and resist tendencies to chemical combinations and dissolutions. A chair, a table, or a pig of metal may be acted upon by various forces, in each

case consequent on its situation as regards the sources of the several forces; but it never controls or adjusts any forces whatever. It is as passive as regards environing forces as towards environing bodies. But every living being controls forces to some extent. When the particle of protoplasm pushes out its pseudopodia it is controlling forces; when it surrounds, draws in, and ingulfs its bit of food it is controlling other forces; when it dissolves and digests the food it is controlling others; when it assimilates the nutriment to its own substance it is controlling still others; and when it propagates by division, or budding, it controls yet others. Gravitation is one, and no doubt heat is another force, which it, with all higher beings, controls; that is, they carry on their life operations always in opposition to gravitation, and always in the presence of heat. Digestion means a chemical breaking down of aliment, while assimilation means a chemical re-building of the same; so there is always more or less control of chemical force: without such control life could not exist in any being for a single moment. Prof. SCHUTZENBERGER says: "No one doubts that in organic cells, whether they be isolated, like those of yeast, or form an integral part of a more complicated organism, there resides a special force, capable of producing chemical reactions under conditions quite different from those which we employ in our laboratories." (*Fermentation*, p. 44.)

The origin of the heat-force and muscular force in the animal body has been for a long time a great physiological problem; and extensive experiments have been made to solve it with very indifferent success, I think, further than the general conclusion that animal heat originates in some oxygenation or other chemical reaction taking place somewhere along the line between the air breathed and the aliment taken, on the one hand, and the organic structures always in process of destruction and reconstruction on the other. There have also been estimates made of the expenditure of molar force in the circulation of the blood,

inspiration and expiration, deglutition, etc. But I have not met with any careful discussion of the quantity of heat-force expended in radiation from the body, and the continual drain of making the loss good; nor of the measure of force expended in the chemical processes of nutrition and assimilation. Muscular force can be traced to the contraction of muscular substance, as an attached weight is drawn in by the contraction of a stretched rubber cord. But is the contraction of the muscle due to the principle of elasticity as is the contraction of the rubber? Does it come from some chemical reaction in the molecules composing the muscle? Is it a special force with untraced origin? Or is it, as is generally supposed, a metamorphosis of heat-force? or yet, a kind of pressure-force arising out of heat-force? I think that, as yet, there are too many unknown factors in the problem to make it safe to venture even an hypothesis on the subject.

Going to plant life, we see an evident but largely uninvestigated expenditure of force in chemical actions and reactions in unmaking the vegetal nutriment and remaking the vegetable organic products and forms. In the flow of the sap there is the exertion of a force very like capillary which has been much considered. In the process of growth, that is, of the simple addition of particle to particle in fixed place, there is a manifestation of force that is often surprising, lifting soil, rending rocks, etc. I think no satisfactory origin has been found for this force, and the question may arise, Is it a special form of force?

There is another form of force largely exhibited in plant life which seems to be the same as we find in dead matter, just as gravity is the same in live and dead matter. I refer to elasticity. When the wind whistles through the boughs of a tree it presses against the branches with a power which overcomes the elastic force of their particles to a degree, and then, the pressure slackening, elasticity carries them back to their normal position. The amount of molar motion per-

formed by the boughs of a large elm or hickory in the course of a windy day is something wonderful; and all of it denotes the expenditure of elastic force, first in resisting the wind pressure, and then in regaining position; but I have never met with any estimate of such expenditure. But, as remarked, this seems to be the same as other elastic force with the same origin. It is given to the live tree to enable it to bend instead of breaking before the storm. The dead tree has it in much smaller degree.

IS LIFE A MECHANISM?

This hasty and altogether inadequate summary of the forces engaged in life processes is given in illustration of the proposition that science, as yet, knows entirely too little about these forces for her votaries to assume, as we have seen them do, that they are all controlled on simple mechanical principles. The question is a sharp one between intelligent vitality and mechanism. On the one side stand all the particulars in which, as we have seen, living bodies differ from non-living, each bearing the semblance of an intelligent process. Now, to meet the point of the argument, Materialism is compelled to *invent* how pure unintelligent mechanism can put on this mask of intelligent activity in all these life-processes.

Thus Mr. ROMANES says: "The adjustments everywhere appear to consist in an exhibition of the principles of mechanism." Prof. HUXLEY says: "To speak of vitality as anything but the name of a series of operations is as if one should talk of the horology of a clock." And Mr. HINTON: "The animal body answers exactly to a machine such as we ourselves construct."

The first observation pertinent to these declarations naturally arises out of the review of these forces just submitted, and is this: There is entirely too little known of the character and origin of the various forces concerned in life phenomena to authorize any biologist

or other philosopher to affirm that they are *only* mechanical ; that they are not intelligently directed ; that they accomplish their processes by reason of an inherent tendency or unknown property. They should, it would seem, know something more of these forces, of their number, character, origin, and relations, and how they operate, than science has yet attained to before deciding that they are, without directive control, competent to life-building.

The next observation is, that the necessary logical conclusion from these declarations is that whatever intelligent adjustment of parts and co-ordination of forces may seem manifested in living beings is only apparent, is only fortuitous, is only because, in a particular case, the several forces concerned, each pursuing its own independent and devious way along down the stream of the eternities, have chanced to meet in such manner, and time, and place, and potency as to exactly balance and co-ordinate with each other in the production of the individual being as we see it. The chances against such casual adjustments, as so frequently observed, in each and all the individual beings which do and have peopled earth, *is as Infinity raised to an infinite power, to one.*

But the only possible alternative to this materialistic and fatalistic theory of fortuity is, that the forces concerned are brought together and adjusted by a directive principle, call it what you will, *Life*, *Vitality*, *Nature*, or even "horology,"—it is not the name but the principle which is of moment. It is and must be one or the other; it cannot be both : any attempted compromise between the two theories must be based on an obscuration of the facts. Every one of the first eleven differences distinguished between living and non-living matter presuppose the twelfth difference, and is only explainable upon it ; for, as already shown, they each and all rest upon an intelligent and purposeful co-ordination of ordinary chemical and physical forces.

In discussing the fortuitous theory let us first

notice Prof. HUXLEY's "horology," or adjustment of forces which runs the clock. How is it? Some intelligent purposive mind first planned and then constructed and put together a machine consisting of various wheels, cords, weights, and other parts, and called it a clock. Then he wound up the cords so that gravity could act upon the weights and make them descend continuously, but slowly and equably, and by such descent put in motion the various wheels, hands, etc. So the "horology" consists in the *force of gravity in the weights, so adjusted to certain molecular and cohesive forces in other parts as to give the necessary motion for marking time*. The "horology" is therefore an adjustment of material parts or pieces with a co-ordination of natural physical forces. But the adjustment of parts was made by intelligent will, on a plan, and for a purpose. So the co-ordination of the forces is compelled by a like agent lifting the weights into place. Did Prof. HUXLEY ever see "horology" in a clock that had not been made by man and wound up by man?—that was not the product of intelligent directivity?

Finding, then, intelligent directivity in the clock, Prof. HUXLEY's comparison authorizes us to expect it wherever we find adjustment and co-ordination. Do we find them in living beings? Certainly we do, and most wonderfully displayed and manifested. What, then, is the distinction between the "horology" of a clock and of a living being? It is this: the clock-maker constructs the clock, and then needs to give it directive attention once in twenty-four hours, or once in eight days, to keep its forces co-ordinated; having made the clock he has to keep it wound up. *But in a living being both the construction or adjustment of material parts and the correlation and co-ordination of forces have to be continuous.* There is never a moment when the forces are not being re-co-ordinated and the parts readjusted to enable them to "mark time." In the clock there is only occasional, while in the living body there is continuous, directive control over the

forces concerned. The "horology" of the clock is the action of certain natural forces, under *interrupted* intelligent directive adjustment, while the "horology" of the living being is the action of like forces under *uninterrupted* directive control. Prof. HUXLEY's figure is very apt and instructive.

The like similarly and like distinction lie between all machines and all living bodies. They are similar in that they are all run by natural forces directly controlled; they are dissimilar in that the machine is humanly constructed, and humanly controlled with *intermittent* attention, while the living being is constructed and directly run by power other than human, *uninterruptedly* exerted.

And this shows us how nearly right and how far wrong are Mr. ROMANES and Mr. HINTON—the one: "The adjustments everywhere appear to consist in an exhibition of the principles of mechanism;" and the other: "The animal body answers exactly to a machine such as we ourselves construct."

But, evidently, the principles of mechanism here discussed are not the principles which these philosophers had in mind. Evidently, they had before them wholly imaginary machines, such as never were and never will be, *unmade* and *uncontrolled* machines. With such wholly imaginary machines they compare organic nature, and believing they detect a similarity, the latter is declared to be mechanical.

CELL-THEORY AND LIFE.

SCHWANN demonstrated that all living matter is made up of one or more cells or individual units of life-matter which take nutriment, grow, and propagate. It is claimed that this is incongruous with the theory of a vital directive principle regulating all the forces in the living body. Thns: "Acting in another direction, it put an end to the theory of a special vital force, which was in full sway when it was first promulgated, and raised up that of physico-chemical action,

which has taken its place. How was it possible to reconcile the notion of cellular individuality with the existence of a single vital force presiding over the working of all the functions? It would be necessary to reject such a hypothesis and seek the reason of vital phenomena in the properties of molecules and atoms, or else to assign a vital force in miniature to each cell. SCHWANN insisted that the hypothesis was both insufficient and superfluous." (*Pop. Science Monthly* June, 1890, p. 262).

"Seek the reason of vital phenomena in the properties of molecules and atoms." What does that mean? It means much more than Prof. TYNDALL's "promise and potency of life in matter;" it means that each atom and molecule is endowed not only with the inherent activity necessary to perform its part of the functions of life, but with the capacity of performing them in exactly the right manner, place, and time to fit in or adjust with the like performances of all the other molecules or atoms engaged in the phenomena of the particular individual being; that is, *a knowing how to do its part*. It means, then, that the atom or molecule is inherently endowed, not only with the dynamic capacity, but the intelligence to do its part of the work in life-building. LILIENFIELD says: "The necessary laws of thought and of matter are one and the same. Thought is condensed motion, and since the human organism is but an involution of physical forces, thought must also be regarded as merely the condensed action of physical forces." It means all this and much more.

But let us measure up the size of the proposition. Living beings are composed of atoms of oxygen, nitrogen, hydrogen, carbon, iron, phosphorus, etc. These atoms are not stable and immortal in living bodies. By the processes of life, or by decay and disintegration they are in continual flow into, through, and out of life. Physiologists say the whole human body is changed once in every seven years. Plants take nutriment from the soil and atmosphere and

build it into thousands of chemical substances and innumerable organisms. Animals feed first on plants and then on each other. So it must happen that continually and almost universally the same atoms are now constituting a part of this peculiar substance in this particular organ of this plant, and now of that substance in that organ of that plant; now of this substance in this organ of this animal body, and now of that substance in that organ of that animal body. And by the theory it has the inherent activity and intelligence to fill out its place and aid in the construction of whatever substance, in whatever organism, and whatever body it may chance to find lodgment. This is equivalent to saying that in life-making each atom of the elements employed is practically *infinitely intelligent*, not only as regards its own office in each particular position, but as regards the necessary co-ordinations and adjustments to bring its action into alignment with the actions of myriads of like independently intelligent atoms with which it must associate in life-building. And to be logically consistent, we must suppose that this endowment, this knowing how to build living organisms, is coeternal in time with the atoms themselves; it is an intelligence that they always and everywhere possess.

But much more than this: After we have endowed these atoms of oxygen, nitrogen, carbon, etc., with the requisite activity and infinite intelligence, we are still not prepared to set them to body-building, not even of the simplest organism, until we have a *purpose* for them to perform and a *plan* for them to work by. How is this difficulty to be met? Shall we say that each atom of these elements is also eternally endowed with an infinitude of purposes and plans in life-building, as well as with an infinite knowledge of the purposes and plans of all the other atoms with which it may have to co-operate in all the processes it is liable to find waiting in its path? Shall we say that, preparatory to the building of each organism, the atoms concerned "mutnally agree in some kind of a

congress" on a purpose and plan? Or shall we say there is no purpose and no plan at all in the phenomena of life,—that it is all casualty and chance? This last would be a short-cut explanation. It would do away not only with plan and purpose, but with intelligence and many other troublesome facts as well. But would it explain anything? Certainly not. And, aside from these three, what other hypothesis for explaining attainment to purpose and plan by the elementary atom can be advanced? Is it not plain that the proposition to "seek the reason of vital phenomena in the properties of molecules and atoms" is big with insurmountable difficulties,—that it is no explanation for anything,—that it is simply shoving back out of observation one of the deepest problems in biological philosophy?

But there is an alternative presented, and I think, correctly. We must "else assign a vital force in miniature to each cell." I think so, provided I may be allowed to correct the phraseology, and call it a *directive principle*, or an *intelligent purposive principle*, instead of a "vital force." The cell feeds, grows, multiplies, and adjusts itself to the needs of the organism or function with which it is concerned. It seems to do all this with a marked degree of independence and individuality: and it is all intelligent, purposive work. According to the contention outlined all the way through these pages, intelligent purposive work is possible only as the result of activity controlled by an intelligent, purposive principle. Therefore, just to the extent that such phenomena are exhibited by living cells are the cells dominated by "vital forces in miniature." COSTE says: "Beneath the form of the egg, and beyond what the eye views, there is something which sight cannot reach,—something which contains in itself the sufficient reason for all those differences now concealed under unity of configuration, and only to become visible later."

But a difficulty is raised here. "How?" It is asked, "was it possible to reconcile the notion of cellular in-

dividuality with the existence of a single vital force presiding over the working of all the functions?"

If each cell is controlled by an individual intelligent, purposive principle, how can an organism made up of countless thousands or millions of such cells be governed by a like principle? In our present state of ignorance the *how* of this difficulty cannot be fully explained, but the *fact* has numerous illustrations and analogies. In physics, each atom composing the mass of the earth has a tendency to gravitate towards every other atom in the universe, with an actual tendency to motion composed of all these gravitational tendencies. Yet all these atoms are controlled by a higher, common tendency to move in mass toward the sun, under which common tendency the whole mass actually attains to a single, simple, composed motion in an orbit around the central orb. The same principle is more adequately illustrated in vegetable life, as in an aster, an elm, or an oak. Every bud on an elm is an individual with an individual life-power, capable of an individual existence. Therefore it has individuality and, to a degree, independently, all the potency necessary to carry on the phenomena of life; that is, "vital force," or, rather, intelligent purposiveness. At the same time it is a part of the tree, engaged in carrying on the composed life-functions and phenomena of the whole plant under a higher principle of directivity, to which all the buds and other organs are subject. The principle is more fully illustrated in the natural history of compound beings, numerous in the lower orders, where individuals are independent in the performance of some of the life-functions, and composed into compound beings in the performance of others.

Prof. ALLMAN has already been quoted: "The whole complex organism is a society of cells in which every individual cell possesses an independence, an autonomy. With this autonomy of each element there is at the same time a subordination of each to the whole, thus establishing a unity in the whole

organism and a concert and harmony between all the phenomena of its life."

And Prof. W. K. Brooks, in an article on "*The Growth of Jelly-fishes*," published in *Popular Science Monthly* (September, 1888), says: "The community is more like a thicket of suckers than a single tree, for all its members spring from one system of roots, and although they may be numbered by hundreds or even thousands, form one continuous organism.

"The stomach of each member of the colony is directly continuous with the hollow roots, and, through these, with the body of every other member, and any food which is captured and digested by one serves to nourish all, since it circulates everywhere through the roots, as water flows through the mains to all the houses in a city.

"The whole is the result of multiplication by buds, and all the members are derived from one, which, hatched from an egg and fastening itself to a shell, founded a new colony. A new bud may grow out anywhere from the roots, and as the current of food, which is always sweeping by, provides it with ample nourishment, it grows quickly, and the repetition of the process of budding brings about a rapid increase in the size of the community.

"The existence of a mechanism for propelling food to all its members facilitates the division of labor, or polymorphism, which is the most remarkable characteristic of these hydroid communities. In human history division of labor has permitted many persons to train and qualify themselves for many pursuits which do not contribute to the food supply. The existence among the hydroids of a mechanism for feeding them independently of their own efforts has permitted the same sort of specialization to grow up, and even to become more perfect in some respects than it is among mankind.

"A young *dysmorphosa* colony consists of a creeping root which carries a number of hydras. They are the eating and digesting members of the society.

Each of them has a long tubular body, almost completely filled by a capacious stomach, which opens to the exterior, at the free end of the body, through a mouth which is mounted upon a short, flexible proboscis, and is surrounded by a circlet or crown of long, elastic tentacles, radiating out in all directions around the mouth, and fringed by a poisoning apparatus of microscopic darts, which kill all the small animals which venture within the sweep of the tentacles. The food that is thus captured is conveyed to the mouth, and is swallowed and digested.

"As the colony grows, and the feeding members become numerous enough to store up a stock of nutriment, a few non-productive parasites are produced. They are the fighting members, and have neither mouths nor stomachs, but each consists of an enormously elongated body, which ends in a battery of poison-darts, which is comparable to a circlet of undeveloped tentacles. The entire body of one of these fighting hydras is practically equivalent to a single enormous tentacle, although comparative anatomy shows clearly that it is not a tentacle, but that it corresponds to the whole body of a feeding hydra, tentacles and all, rather than to a single tentacle; that it is actually a hydra which has, during the evolution of the species, lost its mouth and stomach, and its power to capture and swallow food, and has become specialized for defence. These long, slender, outstretched bodies project far beyond the other members of the colony, and their poison-batteries wave in all directions over the heads of the feeding hydras. The shock of contact with them is either fatal or violent enough to paralyze any intruder, or to cause it to beat a hasty retreat.

"As the community gains in numbers and strength buds of a third sort are produced from the root, and become the reproductive hydras or *blastostyles*. They are much like the feeding hydras in shape and in general structure, but the tentacles remain rudimentary throughout their life; they have no mouths, and their

capacious stomachs do not open to the outer world, although their walls vigorously assimilate the food which flows into them through the roots.

"As soon as the blastostyle is fully grown, a circlet of buds grows out from its body, just below its rudimentary tentacles. These buds soon acquire an organization which is very different from that of any of the forms which have been described, and, developing organs of locomotion, are ultimately detached from the blastostyles, and are set free to begin their independent life as solitary swimming jelly-fish."

Prof. HUXLEY does not appreciate the difficulty. He says : "The body is a machine in the nature of an army, not of that of a watch. Of this army each cell is a soldier, an organ, a brigade ; the central nervous system headquarters and field telegraph; the alimentary and circulatory system the commissariat. Losses are made good by recruits born in camp, and the life of the individual is a campaign conducted successfully for a number of years, but with certain defeat in the long-run. . . . One needs not hesitate to admit that the conception of the life of one of the higher animals as the summation of the lives of a cell-aggregate, brought into harmonious action by a co-ordinative machinery formed by some of these cells, constitutes a permanent acquisition of physiological science. . . . Living matter differs from other matter in degree and not in kind ; the microcosm repeats the macrocosm ; and one chain of causation connects the nebulous original of suns and planetary systems with the protoplasmic foundation of life and organization" (*Pop. Sci. M.*, Oct. 1881, p. 806). That is, he sees how individual cell-action can be co-ordinated into producing organs ; how "the life of one of the higher animals can be a summation of the lives of a cell-aggregate, brought into harmonious action by a co-ordinative machinery formed by some of these cells." He sees how the living cells can do this, and all *without* intelligence and without a higher directive principle. I confess I do not. But why should any one who can accept that proposition as sound

object to the theory that the same effect may be produced by the control of a higher principle over the living cells?

May not the question well be asked, How is it possible to reconcile the notion of jelly-fish individuality with the principle on or by which each and all are induced or compelled to work in their own several lines for the benefit of the whole community? No doubt this also is very difficult to explain, but it is a *fact* that must be accepted. And it is not seen how it differs in principle from the other *fact*, that while living cells are endowed with a degree of independent individuality, they are in all organisms subordinate in a degree to a higher intelligent directivity. Certainly the hypothesis of "vital force" is not, and will not be, "superfluous" until something is presented to take its place more satisfactory than any opposition theory yet brought forth; nor do I believe that a careful analysis by any competent thinker will find it insufficient."

The theory of "vital force"—*intelligent directivity*—comports well with the theories of Consciousness and Heredity set forth in preceding chapters. Indeed, the two theories are complementary, forming the two halves of a larger theory, including all the phenomena of life and thought; and I am satisfied that on no other theory ever yet advanced can the mind of man be rescued from the abyss of mechanical necessarian fatalism. Dr. W. T. HARRIS says: "The plant builds its structure according to an ideal model—not a conscious model, of course." Prof. FRED. COHN says: "Water, earth-salts, and the gases—the raw materials which the plant sucks up—are changed within the cells into starch and sugar, gum and woody fibre, albumen and wax, oil and resin, into powerful medicines and deadly poisons. The simplest plant possesses an art which the most skilful chemist has not been able to learn from it.

"Every cell possesses the art of forming different fabrics out of the same raw material."

LIFE A PROCESS.

Mr. SPENCER defines Life as "*the continuous adjustment of internal relations to external relations.*" He thus makes it a process only, and not a principle; a process dependent on the actions, reactions, and interactions of ordinary natural forces. Indeed, he founds his philosophy of life as well as all the rest of his system on the persistence of energy, and makes life-force but a correlation of ordinary molecular forces. Prof. FISKE agrees with him precisely in definition, and in making life a process.

But Mr. SPENCER seems to go farther than Prof. FISKE is willing to follow. He says: "Various classes of facts thus unite to prove that the law of metamorphosis, which holds among the physical forces, holds equally between them and the mental forces. Those modes of the unknowable which we call motion, heat, light, chemical affinity, etc., are alike transformable into each other, and into those modes of the unknowable which we distinguished as sensation, emotion, thought; these, in their turns, being directly or indirectly re-transformable into the original shapes. That no idea or feeling arises, save as a result of some physical force expended in producing it, is fast becoming a commonplace of science; and whoever duly weighs the evidence will see that nothing but an overwhelming bias in favor of a preconceived theory can explain its non-acceptance. How this metamorphosis takes place; how a force existing as motion, heat, or light can become a mode of consciousness; how it is possible for aerial vibrations to generate the sensation we call sound, or for the forces liberated by chemical changes in the brain to give rise to emotion—these are mysteries which it is impossible to fathom. But they are not profounder mysteries than the transformation of the physical forces into each other." (*First Principles*, p. 217.)

After specifying several of the ordinary forces concerned in the phenomena of life, it is added: "To

these known modes of motion has next to be added an unknown one—a force which is unknown in the sense that it cannot be assimilated with any otherwise recognized class. It is nerve-force—a force habitually generated in all animals, save the lowest, by incident forces of every kind." (*Collins's Epitome of Synthetic Philosophy*, p. 72.)

This unknown nerve-force is therefore only a link in the chain of correlations between the known "incident" physical forces and the products of brain action, thought, emotion, volition, etc. However, Prof. FISKE is of the opinion that Mr. SPENCER does not mean this,—that he does not intend to make mental modes correlations of molecular forces. If such is not his meaning, Mr. SPENCER has been very unfortunate in selecting language which does convey that meaning most precisely. But Mr. SPENCER is not the only great philosopher, by any means, whose language frequently fails of conveying his true meaning, or at least leaves one in grave doubt as to what the real meaning is.

Mr. SPENCER says: "We have, therefore, no alternative but to say that the living particles composing one of these fragments have an innate tendency to arrange themselves into the shape of the organism to which they belong. We must infer that a plant or animal of any species is made up of special units, in all of which there dwells an intrinsic aptitude to grow into the form of that species,—just as in the atoms of salt there dwells the intrinsic aptitude to crystallize in a particular way." (*Princ. of Biology*, vol. i., p. 180.)

With Mr. SPENCER, therefore, Life is not a *principle*, not an essence or entity, but a phenomenon, a phase of action, an attrition between physical forces. His "unknown nerve-force" is of the same order and character as ordinary known forces. Living beings are things, ground into form by the blind rasping and clanking of the various physical forces upon each other, by reason of a stringent necessity inherent in them.

In each individual of all the infinite multitudes of living beings peopling earth there is nothing, however beautiful and intelligible it may all appear, but the accidental products of the incidental clashing of a set of undirected and unintelligent forces, each of which has been running its own independent and unrelated course from the earliest dawn of eternity. When once the true outlines of Mr. SPENCER's theory is grasped by the calm and reflective mind, it is more repellent to reason than would be the notion that a dozen blind and untutored savages, with hammer, tongs, and anvil, could turn out the finest and most intricate piece of machinery, a watch, a steam-engine, or a printing-press.

In a certain sense, however, Life *is* a correlation or co-ordination of natural forces as held by Mr. SPENCER, for all the phenomena of life, as has been shown, is the result of the action of co-ordinated forces. But when it is meant that the correlated forces are *all* that underlie the processes of life, it is not and cannot be true; for there can be no correlation without some control or direction by some superior principle. It has been shown that the odds are greater than infinity to one against the various forces co-ordinating themselves in the infinitude of organisms peopling earth.

MECHANISM AND PERSONALITY.

Since this chapter was written I have had the pleasure and profit of reading the very thoughtful work of Prof. FRANCIS A. SHOUP, D.D., *Mechanism and Personality*, just out, in which he takes decided position in favor of the doctrine of a *vital principle*. He says: "We are bound to take the fact as it stands, and recognize in protoplasm that very something, vitality, which is not a necessary factor of matter. The non-material factor confessedly gives to matter the potentialities through which organization and co-ordination are accomplished in all animate structures; and it is through this factor that the one indispensable fact of

the universe which we call personality is made conceivable. It is thus absolutely necessary for the physicist to start with matter *plus* the one fact through which explanation becomes possible, or through which anything ever obtains which needs explanation." (Page 70.) "And we cannot conclude that mind is but a product of matter, since the effect to be accounted for, in such case, is necessarily the factor through which this or any other cause is demanded." (Page 71.) "This opens up to us the consideration of that vast region of activity called automatic. We cannot thrust it aside, and we cannot explain it by the principles of pure mechanism. It has in it, *e.g.* *hypothesis*, that factor of the Universe which is not material, or to be safe, which removes living matter worlds away from dead matter,—a fact freely admitted, as we have seen, by the leaders of scientific thought. In the lowest vitalized form—in the protoplasmic unit—the life-principle is what gives rise to structure or mechanism, and without it no such thing could come to pass. There seems to be no good reason why the metaphysician and psychologist should hesitate to go down fearlessly into this world of basic personality and claim for it the heritage which the physicists so freely offer. If the evolutionist can build up the marvellous human mechanism out of the minimum of structure, and even it confessedly dependent upon vitality as a necessary condition, why may not the psychologist build up the conscious personality out of the positive and antecedent fact which the physicist has to borrow for his structural advance? Surely there is an advantage in the start; and in the end the jump from the highest dumb creature to speech-using man is not more desperate than the leap which the physicist is compelled to make from the highest brute mechanism to that of the lowest human organism, *plus* his psychic nature. . . . When the evolutionist shall add to the theory as commonly propounded, the fulness of that life-factor, acknowledged, but made so little of in the development of mechanism, which implies an ever active and intelli-

gent personality, the physical side will have lost nothing, and the metaphysical will feel itself no longer outraged" (*Ibid.* 88). "But, however else we may think, the evolutionist cannot be permitted, without protest, to shut his eyes to the life-element, with its psychical potentialities, which lies on the other side the chasm which separates mere mechanism from the thought-world" (*Ibid.* 90).

But Prof. SHOUP seems to be content to stop just short of making "vitality" an *intelligent principle*, though it seems to me that, logically, he must go on to the full extent of the doctrine herein advocated. And I am not well pleased that he should be so easily satisfied "that the leaders of scientific thought clearly see and have explicitly stated" the doctrine of "vitality." Here is the way he speaks of it: "It is thus absolutely necessary for the physicist to start with matter *plus* the one fact through which explanation becomes possible, or through which anything ever obtains that needs explanation. This the leaders of scientific thought clearly see and have explicitly stated, as will abundantly appear; but the metaphysical and theological world is either ignorant of the fact or regard it as of no importance." He quotes at length from TYNDALL, HUXLEY, SPENCER, DARWIN, DU BOIS-REYMOND, and M. PASTEUR, "leaders in science," to prove that his assertion is correct, and that the "metaphysicians and theologians" *misapprehend and misstate* the doctrines of these learned men. His quotations are too lengthy for my space, but I do not find the doctrine of "vitality" in a single one of them; nor, except in Pasteur, anything more than a mere disavowal of atheism with a shadowy assertion of a "non-material factor." I have already quoted from SPENCER, HUXLEY, HAECKEL, ROMANES, and FISKE, "leaders in science," explicitly and distinctly disavowing "vitality." I might continue to quote to the same effect almost without end from these and other distinguished scientists. DU BOIS-REYMOND says: "Natural science is the resolution of natural processes into

the mechanics of atoms." Prof. LE SEUR says: "Science does not attribute purpose to nature." Dr. BASTIAN says: "What we call life is regarded as one of the natural results of the growing complexity of our primeval nebula." Prof. TYNDALL says: "I discern in matter the promise and potency of every form of life." Prof. YOUNG says: "Vital effects can no more be dissociated from the properties and powers of matter than chemical or physical effects." LAMARCK said: "Life is purely a physical phenomenon." DU PREL says: "The formation of living matter denotes nothing but the setting in of the effect when the given causes are sufficient." "Every rational physiologist is compelled to trace the genesis of life to a peculiar aggregation of chemical and physical forces. The process of life, both in its beginning and in its repetition, must be referred to a special kind of mechanics."—VIRCHOW. "There does not exist any power on earth save that which is inherent in earth itself."—BURMEISTER. "Both the organic and inorganic worlds are dependent only upon mechanical forces."—WEISMANN. "Mind is only in matter; matter is only in mind. . . . Evolution not only denies, but disproves totally and forever, the existence of a Being over and above nature by whose will we exist."—E. P. POWELL. "The same forces that whirl suns and planets in a restless march through shoreless space measure the phenomena of the moments of life."—L. R. CRITTISS. "In vital phenomena we have to do, not with a new activity from without, but with a new and higher development of a force which is inherent in matter, and thus manifests itself at a certain stage in chemical development."—T. STERRY HUNT. "The ultimate atoms of matter are animate, each atom having united with it, and forming its unity or atomicity, a sensitive principle."—ROSMINI. "Consciousness is an attribute of matter."—Prof. COPE.

"Take a pair of mice and a cask of flour. By copious nourishment the animals increase and multiply, and in the same proportion sensations and feelings augment.

The quantity of these latter possessed by the first pair is not simply diffused amongst their descendants, for in that case the last must feel more feebly than the first. The sensations and feelings must necessarily be referred back to the flour, where they exist, weak and pale it is true, and not concentrated as they are in the brain ” (UEBERWEG, *quoted approvingly by* TYNDALL).

“ Vital forces are also transmutable into and derivable from physical and chemical forces. Sun-force falling on the green leaves of plants, is absorbed and converted into vital force, disappears as *light* to reappear as *life*.”—Prof. JOSEPH LE CONTE. Prof. MATTHEUCCI says: “ The living organism is a machine, like the steam-engine.” HAECKEL says: “ No physiologist thinks nowadays of looking upon any phenomena of life as the results of vital force.” GEORGE HENRY LEWES says:

“ Both Life and Mind are *processes*. ‘ Neither is a substance; neither is a force. To speak of Vitality as a substance would shock all our ideas; but many speak of it as a force. They might with equal propriety hold Mortality to be a force. What, then, is meant by Vitality, or vital force? If the abstraction be resolved into its concretes, it will be seen that a certain process or group of processes is condensed into a single expression, and the final result of this process is transposed from a resultant into an initial condition, the name given to the whole group of phenomena, and the *product* is supposed to have been the *producer*. In lieu of regarding vital actions as the dynamical results of their statical conditions, the actions are personified, and the personification comes to be regarded as indicating something independent of and antecedent to the concrete facts it expresses.’ ” (*Problems of Life and Mind*, vol. i p. 110.)

Prof. JOHN BURROUGHS says: “ Out of the potencies of matter itself science traces the evolution of the whole order of visible things. . . . The most advanced science of our time does not regard life as a special and separate principle, a real entity which has

been added to matter, but as a mode in which certain physical forces manifest themselves. Mechanical, chemical, and physical forces are the only efficient forces in the living organism—at least the only ones which science can recognize; and these forces are the same in both the organic and inorganic worlds.” (*P. S. M.*, Dec. 1886, p. 154.)

BUCHNER says: “Just as the movement of a watch is naught but the result of materials and forces working together in a particular manner, so life also is no *force*, but a resultant or movement of particles grouped in a definite order. He who thinks a special ‘vital force’ to explain life is as illogical as he who traces the movements of a watch to a special ‘watch-force.’”

Not only do a large majority of the leaders in scientific thought thus disavow Vitality as a distinct power in living beings, but they do so consistently, since the logic of their various systems necessarily leads to this conclusion. The theologians and metaphysicians have not misread them, for it does not follow, as Prof. SHOUP seems to imagine, that because they are not avowed Atheists, and do not discard all spiritualistic principles, they are not therefore practical Materialists. The great question concerning opinions is not what one theoretically believes, but where his elemental doctrines logically land him. Prof. SHOUP does not seem to find distinction between his “Vitality” and Prof. Huxley’s “Horology,” or Mr. Spencer’s “watch-force;” but, logically, “Vitality” must lead him to a belief in a personal Deity, while “Horology” and “Watch-force,” followed to their logical conclusions, will inevitably compel these great thinkers to deny such a Deity. Is such a difference of no importance? Is it well to throw a bridge of fine phrases over such a chasm, and blame those who are unwilling to traverse the same? I think not. I think we have had altogether too much of this kind of elucidation of the doctrines of those great physical investigators.

And while Prof. SHOUP advocates "Vitality," he still seems to make of it a principle of mechanism; not appreciating that "vitality" in any vital sense, any practical sense, is utterly incompatible with a mechanical structure of organic nature; that 'vitality,' unsupported by intelligence, is not "the one fact through which explanation becomes possible;" but, on the contrary, that *that* "one fact" lies much deeper, cutting clear under his mechanical notions of Life, and being entirely incompatible with them.

The conclusions reached in this chapter are, therefore: (1) There is a profound and radical difference in *kind* between living and non-living matter. (2) This difference is due to a principle in living matter not comparable to nor illustrated by either crystallization or the production and running of mechanical contrivances. (3) This principle, which I call Life, is intelligent, carrying both plan and purpose, and also dominating physical and chemical forces. (4) It is incompatible with and directly exclusive of all forms of mechanical necessity. (5) All systems of *non-materiality* stopping short of this are illogical and self-destructive. (6) Almost the whole body of Scientists and Physical Philosophers are on the side of a mechanical Nature against such a purposive Life-principle.

CHAPTER VII.

EVOLUTION.

SCOPE OF THE QUESTION.

THE discussion of Evolution involves the consideration of two questions of vast moment: (1) What causes operated in the production of the Universe? (2) Through what processes was it produced? That is, who or what made it? and how?

These questions are nearly related, yet wide apart. One school of thought says the *Process* was *Creation*, the *Cause*, *Deity*; another says, the *Process* was *Evolution*, the *Cause*, *Deity*; while a third says the *Process* was *Evolution*, the *Cause*, *Itself*, or *Law*, or *Nature*, or some other Impersonal and Unintelligent Principle. If the *Process* should be shown to be *Creation*, it would follow, of course, that the *Cause* was *Deity*; if the *Cause* should be shown to be some *Impersonal Principle*, it would follow, necessarily, that the *Cause* was *Evolution*; if the *Process* should be shown to be *Evolution* it might be contended that the *Cause* was either *Deity* or some *Impersonal Principle*; if the *Cause* should be shown to be *Deity*, it might still appear that the *Process* was either *Evolution*, or *Creation*. So the three possible doctrines are, as above mentioned, *Creation by Deity*; *Evolution by Deity*; and *Evolution by some Impersonal Principle*. Therefore an argument may be pitched to show that the Universe was produced by *Deity* without distinguishing by which process; likewise it may be urged that the process was *Evolution*, without distinguishing by which cause. But by far the greater portion of evolutionary literature is written to show, at once,

how and by whom Nature was produced ; that is, to show *how Nature has been enabled to produce herself*. The logical outcome to such conclusion would be that there is no need for Deity in the production of Nature ; and, therefore, He is not ! So that while it is true that Evolution is not necessarily incompatible with the doctrine of a purposive Deity, yet a very large part of evolutionary studies naturally lead towards the negation of that doctrine, *because* they are pursued with the purpose of finding how *Nature may have evolved herself*.

Mr. SPENCER is the only philosopher who has attempted to give an exhaustive explanation of evolutionary processes in inorganic nature. As often mentioned, he founds the whole explanation on the doctrine of the Persistence of Force. I have urged so much against that process that I will not stop to consider it here, except to remark that as *Persistence* is not true, in fact, it can afford no explanation of Evolution ; whether the *correct* doctrine of Forces will afford such support need not be now discussed, since it has never been so urged.

LIFE FROM OTHER WORLDS.

I pass therefore to the consideration of Evolution in organic nature, and here two questions have been much considered : (1) How did first Life originate ? and (2) How have change and advance in forms of Life been accomplished ? Another and closely allied question : How has the succession of Life been kept up ? has been but little attended to ; for it seems to be generally thought that if, by any means, *first* Life can be accounted for, the whole mystery is explained. For a time, spontaneous generation was stoutly contended for by Drs. BASTIAN, BÜCHNER, and others ; but it is generally admitted that the experiments of PASTEUR and TYNDALL have determined that abiogenesis does not now occur in nature ; however, the greater number of Evolutionists are agreed that,

originally, Life must have been evolved from inorganic nature. Nevertheless, some scientists, being unable to make out how dead matter could have raised itself into Life, and not being willing to admit any creative act, even in the very beginning, have curiously sought for some other origin of first life. Thus so great a scientist as Sir WILLIAM THOMPSON has proposed the theory that first Life may have reached earth in meteorites from some other world. QUINET considered that "Life is of cosmical origin." Prof. SEMPER says: "Life is derived from organic germs belonging to other worlds." MORITZ WAGNER says: "The celestial atmosphere must be regarded as the permanent conservatory for living forms and the eternal greenhouse of living germs." And Prof. HELMHOLTZ says: "If failure attends all our efforts to obtain a generation of organisms from lifeless matter, it seems to me a thoroughly correct procedure to inquire whether there has never been an origination of Life, or whether it is not as old as matter, and whether its germs, borne from one world to another, have not been developed wherever they have found a favorable soil."

These theorists do not tell us how they know the meteors came from other worlds; or, if they did, how they know there was Life on such other worlds; or, granting that, how the germs escaped the effects of the extreme cold and extreme heat that the meteors must have passed through in reaching Earth. And it seems not to have occurred to them that, granting that Earth-life *did* first come from some other world, the same difficulty in accounting for its first origin occurs there as here; that banishing the problem to distant worlds does not solve it. Of course any proof of such an hypothesis is clear out of question; it is simply a conjectural mode of disposing of the theory of creation.

BÜCHNER puts the theory thus: "The germs or first beginnings of all living things existed from all eternity, awaiting only the concourse of definite external circumstances to develop themselves."

TYNDALL'S THEORY—MATTER ALIVE.

A slightly different theory is offered by Prof. TYNDALL: "It may be, however, that in process of time, vitality will follow the example of motion, and, after necessary antecedent wrangling, take its place among the attributes of the universal mother who has been so often misdefined." E. P. POWELL says: "Life is an essential and universal quality of the universe—without origin and without end." And again: "In reality the inorganic is itself organized. . . . The sand-stone and the limestone are really organisms, formed by definite processes. . . . The inorganic and organic are alike processes of Life."

And Prof. WEISMANN argues to the same effect: "Why should the ancient notion of conscious matter given out by Maupertius and Robinet be not again entertained as pointed out in recent times by Fechner?" (*Essays on Heredity*, p. 714.)

The editor of *Popular Science Monthly* says: "Vital effects can no more be dissociated from the properties and powers of matter than chemical or physical effects." (*P. S. M.*, Nov. 1874, 112.)

That is, they do not assume any separate life-germs existent throughout eternity, but predicate Life and Consciousness as attributes of the atoms of matter themselves. But were there any sound arguments for this hypothesis,—and there are not,—it would help us forward scarcely an iota; since it would still remain to be shown how the lives and consciousnesses of almost infinite clusters of atoms came to be aggregated into individual lives and consciousnesses; that is, how a unity of Life or consciousness is welded out of an almost infinite plurality of either. What brings them together, and compels the aggregation? What is the cause? The hypothesis fails to answer, and therein fails of explanation.

As remarked, the greater number of scientists, being unwilling to admit of creation anywhere or at any

time, concede that there must have been in the beginning a spontaneous production of Life. PAUL R. SHIPMAN says: "The evolution of living from non-living matter is an essential part of the hypothesis of evolution at large. As the watchmaker is developed from the primitive man, so is life developed from primitive matter." Prof. TYNDALL says: "The conclusions of science would undoubtedly be that the molten earth contained within it elements of Life which grouped themselves into their present forms as the planet cooled." And again: "I share with Virchow his opinion that the theory of evolution in its complete form involves the assumption that at some period or other of the earth's history there occurred what would now be called 'spontaneous generation.' I agree with him that 'the proofs of it are still wanting.'"

It is generally argued that as the earth cooled and consolidated certain portions, by the natural action and reaction of forces, first took on a colloid or semi-crystalline form in which certain peculiar molecular motions were set up and advanced to the first beginnings of Life. Thus Prof. T. STERRY HENTZ says: "All matter is instinct with activities, and a great number of those processes which were formerly regarded as functions of organized bodies are really common to these and to inorganic matter. Gravitation, light, electricity, the diffusion and transpiration of gases and liquids, the crystallogenic process and the peculiar relations of colloids, are all, when rightly understood, manifestations of energies and activities which forbid us to speak of matter as dead. To all these dynamical activities of matter supervene those processes which we name chemical, and which give rise to new and specifically distinct inorganic forms. The attaining of individuality by matter, which has always seemed to me the greatest step in the progress of nature, is first seen in the crystal; but therein the forces of matter are in a statical condition, except so far as certain dynamical relations are concerned. It is not until solid matter

rises from the crystalline to the higher condition of the colloid that it becomes capable of absorption, diffusion and even assimilation ; that, in a word, it assumes relations to the external world which show that it possesses an individuality higher than the crystal, and is, in fact, endowed with many of the activities belonging to those masses of colloidal matter which biologists have agreed to call living.

"In these phenomena we have the first developments of individuality and of organization, and I think that the careful student who endeavors with a strong mental grasp to seize the true relations of things will see that we have here to do not with a new activity from without, but with a new and higher development of a force which is inherent in matter, and thus manifests itself at a certain stage in chemical development." And a writer in *Cornhill Magazine* says: "As applied to Life, the evolutionary principle is simply this: that plants and animals have all a natural origin from a single living creature which was itself the product of light and heat acting on the special chemical constituents of an ancient ocean."

But I have met with no attempt to show the exact *modus operandi* of the first passage of the non-living into the living. Perhaps none has been formulated; nor is it easy to see how such a notion could be formulated. The most that appears to have been attempted has been to elevate the action of molecular forces as high as possible on the one hand, while minimizing the processes of life as low as possible on the other, and then to throw an imaginary bridge over the still yawning gulf.

But granting first and lowest Life for the present, the great evolutionary questions remain : By what power, and how, has such first Life been made to assume all its present variety and complexity ? Before advancing to the consideration of the answers to these questions given by the great evolutionary doctrines known as the Lamarckian and Darwinian, with their modifications, certain subsidiary theories put forth by

different philosophers, which are supposed to have more or less bearing on the main subject will be discussed as briefly as possible.

CORRELATION OF PHYSICAL AND VITAL FORCES.—SPENCER.

The first to be noticed is the doctrine of Mr. SPENCER and his disciples that the processes of Life are but a correlation of ordinary physical and molecular forces. Says Prof. LE CONTE : “About this time it began to be evident, and is now universally acknowledged, that all these forces are but different *forms* of one, universal, omnipresent energy, and are transmutable into one another back and forth without loss. This is the doctrine of correlation of forces and conservation of energy, one of the grandest ideas of modern times. But one force seemed still to be an exception. Life-force was still believed to be a peculiar, mysterious principle or entity, standing above other forces and subordinating them. But soon vital force also yielded to the general law of the correlation of natural forces. Vital forces are also transmutable into, and derivable from, physical and chemical forces. Sun-force falling on the green leaves of plants is absorbed and converted into vital force, disappears as *light* to reappear as *Life*. The amount of Life-force generated is measured by the amount of light extinguished. The same is true of animal life. As in the steam-engine the locomotive energy is derived by the fuel consumed and measured by its amount, so in the animal body the animal heat and animal force are derived from and measured by the food and tissue consumed by combustion. Thus vital force may be regarded as so much force withdrawn from the general fund of chemical and physical forces, to be again refunded without loss at death.” (*Evolution and Religious Thought*, p. 35.)

And again, Prof. FISKE says : “The progress of Life on the earth has been the continuous equilibration of the organism with its environment.”

“It has been proved to follow from that axiom of

the persistence of force upon which all physical science is based, that the mere coexistence of innumerable discrete bodies in the universe, exerting attractive and repulsive forces upon each other, necessitates a perpetual rhythmical redistribution of the matter and motion of which the phenomenal universe is composed. This eternal rhythm must of necessity be manifested in alternating eras both general and local —eras in which now the concentration of matter and dissipation of motion, and now the diffusion of matter and absorption of motion, predominate." (*Cosmical Philosophy*, vol. ii. p. 367.)

Again: "Life is a process, consisting in a series of adjustiments between the organism and its environment; and mind, objectively considered, is a special form of Life, consisting in a specialized portion of the series of adjustments." (*Ibid.* p. 368.)

Once more: "From the dynamic point of view an organism is a complex aggregate of matter, in which the permanent structural and functional differentiations and aggregations are rendered possible by the fact that it continually receives about as much motion as it expends.

"The continuous maintenance of an equilibrium between the organism and its environment is the process in which Life essentially consists." (*Ibid.* p. 67.)

Now it is certainly true that all Life-processes involve the use of ordinary natural forces; but granting for the present the claims of persistence to an absolute verity, it is not seen how the fact that the natural forces are so used explains organization any more than does the mere fact that a clock is made and run by utilizing natural forces explain how and by whom it is made and run.

True, BÜCHNER says: "All apparent design is really nothing more than the necessary result of the interaction of natural materials and forces; and of their development in course of time, which brings everything to a certain level by preserving those things which have

vitality in them and expunging those which have not."

L. R. CURTIS says: "The current of scientific thought tends to demonstrate that all the phenomena of nature are to be regarded merely as varieties of motion, one guiding principle of which is conservation of energy. This being an established fact in science, it fortifies us in our position of reasoning downward in the direction of primary causes. By conservation of energy we are to understand that while matter exists throughout the universe in definite quantity, there is also existing as an attribute of matter a definite amount of energy or force; and just so sure as matter is indestructible and *unchangeable*, just so sure is force or energy indestructible and *interchangeable*. . . . The attributes of matter are attraction of gravitation, attraction of cohesion, and chemical affinity. Attraction of gravitation is a force exerted upon each and every atom of matter throughout the universe. . . . The same forces that whirl suns and planets in a restless march throughout shoreless space measure the phenomena of the moments of life. . . . All the phenomena of nature consist in transformations of energy only, the working force of the universe being previously invested in the kinetic energy of its atoms."

And JOUVENCEL says: "Forces necessarily work blindly, and existence arises from their co-operation. Plan in living things has no existence save in appearance. If any one imagines nature works on a serial plan, he will find himself mistaken. The series is a result, not a thought, not a design of nature: it is nature itself. It is, however, perfectly obvious that if the forces of the whole universe constantly act uniformly upon our globe, this work must form a complete and perfectly graduated series."

Profs. STEWART and TAIT disagree with the notion of BÜCHNER and JOUVENCEL that physical forces left to themselves would eventuate in order or symmetry. They say: "The progress is from the regular to the irregular." I think STEWART and TAIT are the nearer

right. Without intelligent guidance the interaction of natural forces could but result in chaos.

But the theory is no explanation in any form. The question is: Why should the attrition of eternally grinding forces eventuate in organization? Asserting that it does so is not to the point. And as heretofore remarked, so little is yet known about the forces concerned in life that it is not safe to venture even an hypothesis as to their origin and lineage. But suppose it should be shown that organization is strictly a result of the adjustment of persistent and correlated natural forces, we are still no nearer to the solution of the main problem, for the question recurs: How was the adjustment *brought about?* What compelled it to be? So we still have to confront the demand for a *cause* for Life-processes, and the most this theory can give us is a *process*, the *manner* in which organisms are produced. But it does not even do this; for, as so often remarked, persistence is itself but a very partial law, since all attrition of forces implies their dissipation, more or less. It comes to just this, therefore, that principle put forth as explanatory of evolution is not true in itself; and if true, it would explain nothing; it would leave us just where we started. It would still be but the history of a process, and processes are not explanations of *causes*. Here, as everywhere, all explanation is inadequate which fails to reach up to and lay hold upon an intelligent purposive cause. Here, as generally with Evolutionists, the effort is to compel unintelligence to labor and bring forth intelligent results.

SPECIALIZATION.

Specialization is a large word with Evolutionists. They seem to think there is some magic in the term which helps to elucidate the doctrine. HAECKEL calls it "*Baer's Law*" and states it thus: "The evolution of an individual of a certain animal form is determined by two conditions: firstly, by a continuous perfection

of the animal body by means of an increasing histological and morphological differentiation, or an increasing number and diversity of tissues and organic forms; secondly, and at the same time, by the continual transition from a more general form of the type to a more special one." (*Evolution of Man*, vol. i. p. 57.)

And Prof. LECONTE says: "It is in exact accordance with the laws of evolution that organic forms are more permanent now than ever before. Evolution is a growth; the forces of growth must exhaust themselves. Evolution proceeds by constant differentiation and specialization. In ontogenetic evolution, for example, cell-structure becomes more and more specialized, but also thereby more and more rigid, and, when specialization is complete, evolution stops, and cell-forms are permanent. It is this which limits the cycle of every evolution. So it is precisely with the evolution of the organic kingdom, except that the cycle is much longer. Here, also, every step is by specialization, and yet specialization fixes the form, and finally arrests the advance on that line. Thus, throughout the whole geological history of the earth, the larger number of forms, by specialization, become rigid and perish, while the fewer, more generalized, and more plastic forms take up the march and carry forward a step, only to be themselves specialized and fixed." (*Evolution and Religious Thought*, p. 249.)

But this principle also is only a process, only the way in which something is done, only the order in which a simple living being advances into a more complex form whether self-caused, or compelled by environment, or by an extraneous power. It furnishes no cause and no reason for anything; hence, it explains nothing.

DIVISION OF LABOR.

Prof. HAECKEL gives great consideration to a closely related principle, to wit: the *Division of Labor*. But

this explains nothing since it, too, is only a process. This very common fallacy of attempting to explain the causes of things by setting out the process by which their forms have been attained is a vice which runs all through Mr. SPENCER's system, as we have just seen, as well as through that of Prof. HAECKEL. It is very true that the higher we rise in the investigation of organization the more marked the specialization and the more minute the division of labor between organs and structures. This is a *fact*, but a fact which explains nothing, which has produced nothing, *caused* nothing. It is *the fact* which itself demands explanation. Prof. HAECKEL would make the fact explain itself, which it cannot do. He would make it the cause of itself, which it cannot have been. What is it that has compelled the Division of Labor in organic nature, together with all the other processes and phenomena of life? This is *the question*. Prof. HAECKEL answers by pointing back to *Division of Labor*, one of the very processes to be accounted for. A Division of Labor has to be the result of intelligent action, emanating either from an express or tacit agreement between the reciprocating units themselves, or from some superior authority dominative over all. In no other way can it be attained to.

Prof. HAECKEL's comparison of the distribution of cells in the construction of organs for the exercise of divers functions to the process of development by the division of labor in the formation of human society, while being a good and suggestive figure, does not, when carefully examined, sustain his theory. He says: "For a very long period these savages" (who, he supposes, have arisen from a single pair isolated on an island), "scattered over the whole island, must have aimed at the one single object of self-preservation. Gradually, however, several families collected at certain places, larger communities arose, and now many reciprocal relations began to arise between individuals; in consequence, a rude division of labor took place. Certain savages continued to fish and hunt, others

began to cultivate the ground, others devoted themselves to religion and medicine, and so on. The ever-increasing division of labor specializes the people into various ranks or castes. . . . A process similar to this took place millions of years ago, when, at the beginning of organic life on the earth, one-celled organisms first developed, and were afterwards followed by many-celled forms. . . . Isolated cells gathered into communities. Groups of cells which had arisen by the continued division of a single cell remained together and now began gradually to perform different offices in life. The first traces of specialization, or division of labor, soon occurred, as one cell assumed one office, another another. These cells are independent living beings, the citizens of the state, which constitute the entire multicellular organism. . . . The cell is an integral organism, or, in other words, an independent living being. . . . It is the organic unit of form of the lowest grade, an individual of the first order. . . . The human body is not in reality a simple life-unit. It is, rather, an extremely complex social community of innumerable microscopic organisms, a colony or a state, consisting of countless independent life-units, of different kinds of cells. . . . The egg-cell potentially represents the whole animal—that is, it possesses the capacity to develop from itself the entire multicellular animal body; it is the common mother of all the generations of innumerable cells which form the various tissues of the animal body: in a certain sense it unites in itself their various powers, but only potentially, only in design. In direct contrast to this, the nerve-cell of the brain is an extremely one-sided formation. It cannot, like the egg-cell, develop from its numerous generations of cells, of which some transform themselves into skin-cells, some into flesh-cells, and others into bone-cells, etc. But instead, the nerve-cell, which is formed for the highest activities of life, possesses the capacity to feel, to will, to think. It is a true mind-cell, an elementary organ of mutual activity. . . . Our whole intellectual life is but the sum

of the results of the activity of all such nerve-cells or mind-cells." (*Evolution of Man*, vol. i. p. 127.)

As with MR. DARWIN in illustrating Natural Selection by the handling of domestic species, PROF. HÆCKEL here uses human intelligence without credit, seemingly unconscious that it vitiates, or rather reverses the point of his argument. He, like MR. DARWIN, is aiming to show how Evolution may occur by unintelligent processes, and they both use human intelligence as illustration and demonstration. PROF. HÆCKEL's units of society in the illustration, are intelligent; and, to give the figure any force, he must allow the same quality to his cell-units. His savages must have agreed expressly or tacitly to the supposed Division of Labor; and the value of the figure lies in the assumption that there is a like understanding arrived at by the intelligent living cells. If not this, then, in either case, there must be the domination of a superior directive intelligence.

Between savages a division of labor could grow only through mutual understanding or consent. If one man is skillful in the chase, and another with the fish-spear, they may readily come to see that it will be advantageous to both, for one to hunt and the other to fish, and then exchange commodities. But if the hunter could get no fish for his surplus game, he would not be likely to forbear varying occupation by fishing on his own account to supply his own wants. So a division of labor implies barter or exchange of products, and it is not seen that it can grow up without it. But barter is not possible without consent—it means the exercise of two rational contracting minds intelligently agreeing.

But, although PROF. HÆCKEL says "an organism is a colony or a state, consisting of countless independent life-units of different kinds of cells," and that "the nerve-cell possesses the capacity to feel, to will, and to think" he would never admit that the aggregated cells of any animal body, ever agreed amongst themselves that one set should do one character of work, and another set another, to the mutual advantage of both, and of the whole commonwealth. This is not what

he means, yet it is only in this light that his figure can illustrate anything, or prove anything, unless it be taken as an argument for a superior intelligent control over all the cells, which he would be still more unwilling to admit.

HINTON'S THEORY.

One other Life-theory, that of Mr. JAMES HINTON will be noticed before proceeding to the main discussion. He thus states it :

"The chemical tendencies have been resisted or coerced, and are, therefore, ready on the slightest stimulus to come into active operation, and the functions are affected by this operation of chemical force upon the various adapted structures of the body. The animal is a divinely made machine, and depending upon a power, the vital modification of force, which it is wholly beyond our skill to imitate, but still involving in the laws of its activity no other principles than those which we every day apply and see applied to regulate the entire course of nature.

* * * * *

"To recapitulate—Chemical affinity is opposed and delicately balanced by other force in the organic body, and this affinity coming into play spontaneously, or through the effect of stimuli which disturb the equilibrium, is the secret of the animal functions. The same principles are acted upon by every boy who makes a bird-trap with tiles and a few pieces of stick : here is the opposition to gravity, the equilibrium of force and resistance, and the unfortunate bird applies the stimulus.

* * * * *

"Everyone knows that decaying substances are the seats of life. The 'mould' that infests the stores of thriftless housekeepers, and the fungi that grow on damp and rotten wood are instances. Thus low forms of vegetation live on the decaying matter. Let us consider what takes place in their growth. On the

one hand, the wood or other substances in its decay, is giving out force; on the other, the developing plants are embodying it in their structure. One body is ceasing to be organic, and therein is giving off its force, and in immediate connection with it another body is becoming organic, and therefore is receiving force into itself. Can we be misinterpreting these facts in saying that the former process is the cause of the latter; and that the decay gives out the force which produces the growth?

"Physical life is a result of the natural laws and not an exception to them; but the conditions are peculiar. As in a fountain the force of gravity, so in a living body the force of chemical affinity, receives a particular direction, and instead of producing heat or electricity or motion, as it does in the inorganic world, it is made to produce a force which directly opposes its own effects. This special direction of the effect of chemical force is the peculiarity of life."

"The chemical forces, as we have seen, are used to produce the living substance; mechanical force, in the resistance of structures which surround the living organism, is used to shape it into the necessary forms. This is nature's division of labor. These are the simple means employed by the Creator for bringing into being the marvels of the organic world. Chemical force stores up the power; the mechanical resistance moulds the structure.

"Form is determined by motion in the direction of least resistance. Law has made it necessary, has carried it in its bosom from the first, and in due time has brought it forth."

This is a very ingenious attempt to account for the phenomena of Life without intelligence. "Mechanical resistance moulds the structure. Organic form is the result of motion in the direction of the least resistance." But what shapes the "mechanical resistance?" what so adjusts the action of forces that "motion in the direction of least resistance" results in form of any kind? Mr. HINTON says, "a law it has carried in

its bosom from the first." This is Necessity again, that necessity which has been discussed in every chapter of this work. It is only worth while here to notice the fact that every theory, without exception, which attempts to elucidate Nature without intelligence, brings up at the same bar.

But it is interesting to notice that, like other Materialists, Mr. HINTON cannot be quite consistent. As Prof. HUXLEY resorts to a man-made clock to illustrate Life, so Mr. HINTON resorts to a boy-made bird-trap for the same purpose. And the trap, like the clock, not only has to be intelligently made but *intelligently adjusted* at short periods to make it effective. As with the "horology" of the clock, so with the aptitude of the trap for bird-catching: it has to be *planned*, made, and operated by intelligence.

Thus, in comparing Life to a machine, Mr. HINTON overlooks the essential principle in every machine, which is, as we have seen, the fact that the parts and forces concerned are planned and co-ordinated by some exterior intelligence; while in living bodies the co-ordinations are made by an interior principle. A man takes pieces of metal and so adjusts them that the ordinary molecular forces in them produce an equable motion for a number of hours, and the clock marks time. But no man ever did, no man ever can, take particles of matter and so place them that they will produce the motions exhibited in the phenomena of living matter. Such phenomena are constantly occurring all around him and in him, but he is not consciously the author of any of it.

Mr. HINTON's own form of expression refutes his argument. He says: "The animal body so far answers exactly to a machine such as *we* ourselves construct. In various mechanical structures adapted to work in certain ways *we* accumulate or store up force. *We* render vapor tense in a steam-engine; *we* raise weights in the clock; *we* compress the atmosphere in the air-gun; and having done this, there is a source of power within them from which the desired action will ensue.

The principle is the same in the animal functions : the source of power in the body is the storing up of force." *We construct* the machine, but *we* do not construct the animal body, nor yet do *we accumulate* or store up force in it. All *that* is done by some power within the animal body itself, and this is a distinction of the very deepest and broadest scope.

Mr. HINTON's theory that the forces of dying beings supply the vital forces of the living has exceedingly little support in reason ; for vitality, whatever it is, has departed before decay commences. Call it what you may, derive it whence you may, class it as you may, while it is in the living form decay does not commence in the sense here used by Mr. HINTON ; and when it goes out all is gone, save an arrangement of material particles as put together by it before it went. Name it what you please, it is as workmen building and changing and furnishing a house, and all the time living in it. The house animated and continually modified, enlarged, and improved inside and out by its busy architectural tenants, is one thing ; deserted and left to neglect and decay, it is another. So with the animal or plant while alive as compared with its material form after death. That which built it up and made it alive is gone, as the tenant-builders are gone from the house. Mr. HINTON says, nevertheless, that its life-principle, that which made it alive, though evanished at death, passes into the moulds which spring from its rotting frame. Just as if one should say that the occupying builders of the house, long after their departure to another city, had entered into and become the life-principle of the bats and owls, vermin, weeds, and moulds which grow up in the house and upon its decaying timbers.

It might be shown by a tedious dissertation on physiological processes that Mr. HINTON's theory of Life arising from a conflict with chemism is entirely untenable. But it has already been shown that Science has as yet made exceedingly little progress in tracing the origin of the vast circle of forces used and

dissipated by living beings. So true is this that any such theory as this of Mr. HINTON's is but a random line at best. It is really only a variation of Mr. SPENCER's system, founded on the doctrine of Persistence, which has already been extensively considered.

LAMARCK AND DARWIN.

So far the same vice runs through all the attempted explanations of the mystery of Life. The absolute necessity of the case is an individualized intelligent principle, and that absolute necessity all the systems attempt to dispense with. The great scientific problem at which all are toiling is some collocation or interaction of natural forces, physical and chemical, which can produce the wonderfully intricate life-forms and life-functions of Nature without any supervising or directing principle whatever. This has never been attained, never will be attained. It is on an exact level with the search for perpetual motion, with just as little principle, reason, or philosophy behind it. Scientists never tire of discoursing on the impossibility of perpetual motion; that army of inventors whom failures never discourage might well return the compliment. And this brings us to the consideration of the two greatest systems of all in which this fruitless effort is made.

These doctrines are known as the *Lamarckian* and *Darwinian* systems. In the *Lamarckian* system the factors of evolution are the "*Pressure of Environment or Use and Disuse, and Heredity.*" The *Darwinian* factors are *Natural Selection*, (including *Sexual Selection*), *Variability*, and *Heredity*. But *Natural Selection*, as formulated by Mr. DARWIN includes and covers "the pressure of environment," though in a very different sense from that which it bears in the *Lamarckian* system. In the latter it means first that the Environment compels changes in living organisms or their germs, which are transmitted to the progeny; and, secondly, that those beings which do not yield

sufficiently rapid and substantial changes to the demands of varying Environment are crushed out by it. In *Darwinism*, it means that those beings which do not, through the principle of Variability, conform to the requirements of Environment shall be sifted out and destroyed by it. In the system of *Lamarck*, it is a double factor both *producing change* and *preserving the best*; in *Darwin's* system it is a single factor, *saving the best*. There is another difference in the two systems which may be noted here: in the former the change may take place in the life of the individual; in the latter only between the lives of successive individuals, that is, in the germ, the unchanged parent producing changed offspring.

ENVIRONMENT.

In all organic transformations, in addition to Heredity already discussed, there must, therefore, necessarily be two factors of primary importance, the one first in order of consideration but secondary in point of time, broadly designated as Environment, and the other known as Variability. This arises from the fact of the instability of physical nature. The physical conditions of the whole world and of all regions of its surface change from epoch to epoch in various ways as regards temperature, moisture, elevation, etc.; and in no two places, at the same time, are the conditions ever precisely the same. It follows that a creature fitted to live in one age may not be fitted to live in another; or, if fitted to live in one locality, may not be in another. Hence it is that as regions change, or as a creature would change its habitat, it must undergo modifications to fit it for the new conditions it has to encounter, otherwise it will perish sooner or later.

There are, therefore, here two great questions presented for discussion in Evolution: First, how does the Environment act upon organisms? to what extent? and with what effect? Second, how are the Variations fitting the organism to meet the changing conditions of Environment produced?

The term Environment is broad and covers several classes of phenomena. Such physical conditions as the elements, air, earth, water, in which a being may have its habitat ; the temperature, amount of light, altitude, freshness or saltiness of water, moisture of atmosphere, etc., form one class. Another finds its explanation in a fact first fully elaborated and applied by Mr. DARWIN, to wit : that of every race of beings many more come into existence than can find either place for occupancy, or food for sustenance, so that they are all the time choking each other out of existence. Another phase of Environment is found in the fact that various classes of beings prey upon others which are in some way at their mercy. Still another phase is found in the dependence of one class of beings upon the help of another, as of the clover upon the humble-bee for fertilization. It follows that any being which is not fitted to its physical Environment of climate, etc., which has not the means of defence against or escape from its enemies, and which has not the facilities for supplying itself with food, stands a poor chance of living in a world where the superabundance of life creates a sharp competition for the best of everything.

These several phases of Environment act together like a succession of sieves with meshes of different sizes and shapes, through which we may imagine all living beings sifted ; the upper sieve catching some, the next others, and so on, in such manner that comparatively few are permitted to pass all the way through. Thus, if the temperature lets them through, perhaps dryness or humidity will stop them ; if they pass these perhaps they will be taken by beasts of prey ; and if they escape these they still have to struggle for food in competition with countless others where they are very liable to go under. So it is, that of all the living germs formed and all the living beings born, only such as can stand all these siftings and run this long gauntlet, are likely to survive to perpetuate their race.

And, as before mentioned, while this is true, it is

also true that in no two localities are the Environments precisely the same. The being which might haply pass through the range of sieves in region A, would very likely be thrown out in region B ; so it might very well happen, that any beings which should migrate from A to B, would have to suffer change, more or less, to enable them to stand the sifting out in the new region. And further, in the same region, the Environment is in continuous change from epoch to epoch ; that is, the meshes of the several sieves change in sizes and shapes, so the beings which readily pass through in one age, may be thrown out in the next. Hence it is that in the same region the living beings must change in harmony with the changing conditions, or be sifted out and destroyed.

Man is the only being who *intentionally* ever does much to modify his own Environment or that of other beings, and he can do so but to a limited extent ; so, that generally, and to a very large degree, the Environment of living beings is dependent on natural physical forces, or upon the incidental effects of the actions of other beings, (including man,) *directed to other ends*. So it is correct to regard the whole Environment of living beings as a *huge piece of purposeless mechanism through which all organisms have to pass*—with safety if moulded to the proper forms and sizes—to be crushed and destroyed if otherwise.

If it could be shown that the two other great factors in Evolution, Variation and Heredity, are equally purposeless and mechanical with Environment, I think we might safely conclude, with the second class of Evolutionists, that the whole system is a process of unintelligent, mechanical development ; and that we could get along without Deity as well as not. But it has already been shown that such is not true as regards Heredity, and it remains for us to investigate Variation and see whether it is mechanical also, or purposive.

LAMARCKIANISM.

Prof. LE CONTE speaks of two "Lamarckian factors of Evolution," both referable to Environment, to wit: "Pressure of the Environment and Use and Disuse;" but in reality, the latter, is itself divisible into two factors, Voluntary Effort, and Involuntary Use and Disuse. Of the first factor Prof. LE CONTE says further: "Undoubtedly the lowest and first introduced was pressure of the *physical environment* affecting function and function affecting structure." He seems to consider that this phase of the process is entirely purposeless, for he continues, referring to the next phase: "For even *use and disuse* of organs implies some degree of volition and voluntary motion, and therefore already some advance in the scale of evolution." And a little further along he adds: "In organic evolution nature operates by necessary law without the voluntary co-operation of the thing evolved." But I think that both in this last observation, and in the inference to be drawn from the preceding he is clearly wrong. I think that all response of a living organism to the forces of the Environment is and must be an intelligent direction of vital forces. Take a hack in a tree by an axe. How is it? Is it healed by a simple reaction of physical forces? Certainly not, but by a concentration at the wound of suitable material intelligently prepared, directed to the point, and then properly placed. Take a blow on the animal body producing inflammation and swelling—how is it? Evidently the blood is sent to the part by Vitality, intelligently and for a purpose. A poison is swallowed, the stomach rebels against it, it is expelled in one direction or another—is there no purpose in this? A foreign substance is lodged in the flesh, a fester grows around it, and it is expelled; or else a tegument is grown around it, and it is encysted so it may do no hurt—are these the phenomena of the reaction of physical forces? Sharp winds impinge upon

a hairless dog and nature gives him a covering,—is it not because the Life-principle within, feeling the need, sets to work to manufacture a protecting coat? Abundance of nutrition causes increased growth—is it not the Vitality within which directs the digestion, assimilation, and appropriation of the redundant material to the various points of enlargement? Food is scarce and the animal has to live on its accumulated store of fat,—is it not the same intelligent principle which directs how and where the stored nutrition shall be transferred and used to support life? Indeed, I know not that it can be shown that in any instance short of the disintegration of structure, do exterior physical forces ever produce modifications of organisms, otherwise than by presenting conditions of excitation or inducement to an intelligent Life-principle within, to place itself in harmony with the Environment. That they should do so is not in accordance with the principles of vital action which always have an end in view, or in other words, work towards the accomplishment of intelligent purpose. Neither is it in accordance with laws governing physical forces where the one great principle of the Parallelogram, or Composition of Forces, seems to prevail universally.

Indeed, the very text-books in the hands of our children in the common schools are full of elementary error regarding the action of ordinary natural forces. For instance, it is taught that if I strike the table with my fist the table strikes back as hard, and in this way and by this cause, my hand is bruised, perhaps my knuckles broken; for has not Newton said that “action and reaction are equal and opposite?” I think that in a great many things Newton did not intend the meaning modern physicists have put into his language. But to the point. The table is absolutely inert; it does not act at all; it only refuses to act, fails to give way and get out of place. I have given my whole fist and arm momentum, they are carried forward by force—when the fist comes in con-

tact with the table it immediately commences imparting force from its forward side to the latter but not in sufficient moment to move it out of the way, the motion of the forward side of the fist is arrested but the momentum of the parts further back, and of the arm, crowd those parts on the front face of the fist forward with such power that the muscular tissues and perhaps the bones give way in the shock and are broken up. As it is in this example with the table, so in the whole material Environment of Life, it does not act in and of itself, but only as it is thrown into motion by exterior forces; it does not go out to hunt up Life; Life puts itself in its way and must take the consequences. If it aligns itself in harmony with the matter and motion of the Environment it survives, otherwise it perishes. The Environment does not compel the change, it only fixes the standard to which Life must conform itself by necessary modification.

So it seems clear that the "Pressure of a changing environment" affects both function and structure through the intelligent application of the "Pressure," by an *interior vital principle* and its effort to place the organ in correlation therewith. And herein LAMARCK was wrong, as is Prof. LE CONTE also, if I have not misinterpreted him. They would, as it seems, answer back the unintelligent and purposeless "pressure of the physical Environment" with an equally unintelligent and purposeless reaction of physical forces within the organism; but in such fashion, nevertheless, as in some unexplained manner, to tend to bring about a more or less perfect alignment of the organism to the Environment. That is, by the working of some unexplained principles, they would bring results apparently purposive out of the purposeless allocation, correlation, and interaction of unintelligent and undirected natural forces. If I understand them aright, they commit the common but fatal error of attempting to educe intelligent action from unintelligent factors, to compel the unintelligent to do intelli-

gent work ; to "extract sunbeams from cucumbers." This is no more admissible here than anywhere else in nature. The material organism no more responds to the physical Environment unintelligently and through the medium of the physical forces in it, than does the table strike back at my hand in the illustration above given. As physical things, as material bodies, living beings are as inert as the table itself. As such they cannot strike back. It is the Vitality in them which strikes back. It is the intelligent Life-principle which responds to the demands of Environment and compels the necessary alignment, if such is made at all. Therefore, the first part of the *Lamarckian* factor of Environment, to wit, the *sifting out* part is a true principle ; the second part, to wit, the *variation-compelling* part is a fictitious principle. It does act in the former way, but not in the latter. Therefore, the latter supposed mode of action does not occur at all ; it can be no factor in Evolution ; Lamarckianism utterly breaks down at this point ; and we are compelled to look further for the cause of Variation.

INVOLUNTARY DISUSE.

The factor of Involuntary Disuse is seen where an organism is deprived of accustomed light without effort on its part, as in the case of cave animals, where the eyes being involuntarily disused become aborted. The *Life-principle* finding no need of the accustomed nutrition to said organs, gradually withdraws the pabulum-carrying circulation from them and directs it elsewhere. That this is the process and the cause here is more evident even than in the case of the "pressure of changing environment" just discussed ; for here there can be no question raised of reaction of internal forces against outer forces, since *darkness* is not a force in any sense ; darkness does not and can not *act* on the organism, it is entirely negative and passive ; and it is because it is so that the vitality of the animal body directs its forces and nutriment away

from the eyes. The like phenomenon is exhibited in the case of a potato-plant growing in a dark cellar. It can not manufacture green coloring-matter, chlorophyl, without the use of light; wherefore it directs its energies to longitudinal growth in the direction of any little chink of light that may be found, so that instead of the vigorous green stalk it would make in sunlight, it produces a long, white, attenuated stem which will reach to and pass through the aperture if other conditions permit. Here, as in the other case, *darkness* can be no active factor in the phenomenon; it can lend no power or virtue to the plant, it can not impinge or strike upon it, can not jostle or in any way directly destroy it; but all the newly directed action originates in the plant itself, with no other excitation than *the purpose to meet a felt want* in the absence of an external impinging force; and human intelligence could not better plan to meet the need.

VOLUNTARY USE AND DISUSE.

The definition of the third factor of Lamarckian Evolution, "Effort or Voluntary Use and Disuse," assumes intelligent purposive action directed to the accomplishment of some end; but generally—and indeed we may say *always*,—except in the case of man exercising for the sake of health and vigor, an end aside from any adjustment to Environment. We may take Mr. DARWIN's instance of the giraffe's neck. He supposes that its extraordinary length has been gradually produced by the efforts of the animal in times of dearth to browse on boughs of trees higher and higher, as the famine became more extreme. If this be the true theory of the giraffe's neck, it is very evident that in all the tedious process of lengthening it out he never once made an effort for the *purpose or with the intent to grow a longer neck*, but always and every time to reach a higher branch or twig.

But the deeper question remains: According to the theory, the conscious effort of the animal being to

attain one end, nutriment, tends to accomplish another and entirely unintentional end, to wit: the lengthening of his neck; so that so far as adjustment to Environment—that is, of the neck of the giraffe to the elevation of his pasturage—is concerned, his efforts are *unplanned and accidental*. He consciously endeavors to attain one object, and in doing so incidentally and unconsciously contributes to another. In reality, therefore, if we stop here, all the adjustments to Environment made by voluntary effort, use, and disuse, except such as those referred to purposively made by man, are unplanned and mechanical; so that we shall have a *mechanical environment, sifting out a mechanical variation and adjustment*, and, as a consequence, a wholly *mechanical and non-purposive system of Evolution*. And this, as I understand it, is the generally received *Lamarckian* doctrine. But it does not go to the bottom. It does not explain the main fact. How does stretching the neck tend to lengthen it? Is this bottom process mechanical also? When the giraffe makes the longest reach he can, do the forces within the organism, unintelligently and undirected, in some unexplained manner, incited in some unexplained way, divert the process of growth from other parts to the neck?—change the circulation?—change the assimilation?—change the character, or at least the quantity of particular characters of molecules and animal substances produced?—change the places and kinds of deposits of growth-material to the furtherance of a definite object, and that object the intelligent alignment of the creature with the conditions of the Environment? Evidently the answer must be in the negative. The work is intelligent and *purposive*, and can be accomplished only by *intelligently directed activity*. So here, as all along, we are compelled to recognize a *purposive Life-principle*, unless we are prepared to accept the utterly contradictory and absurd proposition that *unintelligent and undirected forces fortuitously do intelligent work*. Prof. COPE has partially

grasped the true doctrine. He finds in living beings a definite resultant of the forces which carry on Life, and which he designates as "bathmic or growth force," and whose "movements express *design*;" and, completing his idea in his own words, whose "movements express design, the essential condition of which is consciousness." If, as I understand him to do, by *consciousness* he means simply *intelligence*,—a very common use of the term in late years,—I agree with him fully; but if he gives it its more precise meaning of apperception, or *self-consciousness*, I think that science has not yet laid bare sufficient facts to justify the opinion. Prof. COPE says, further: "Since the essential peculiarity of growth-force is its instant attendance on the needs of consciousness, it is a permissible hypothesis that its activity is immediately due to consciousness. Consciousness constitutes, then, the only apparent initial point of motion with which we are acquainted. If so, we are at liberty to search for the origin of physical forces in consciousness as well as the vital" (*Origin of the Fittest*, p. 396). And again: "Regarding for the time being the phenomena of life as energy primitively determined by consciousness," etc. (*Ibid.* p. 425).

But although Prof. COPE seems to argue that intelligent purposiveness must guide all vital action, he interweaves the doctrine with several others that I think neither well considered nor tenable. However, I am glad to find myself supported by so great a thinker in the doctrine that *some* vital actions are purposely performed, and am only sorry that I am unable to travel his paths further. But his arguments, like my own, put an interpretation upon *Lamarckian* philosophy entirely inconsistent with a system of mechanical Evolution, and that is the point in hand now, though in the end he reaches a materialistic goal by a round-about path.

NATURAL SELECTION.

According to Mr. DARWIN's theory, the variations which living beings undergo preparatory to adjustment to Environment are produced by causes unknown, and *not having such adjustment in view*. They are made in every direction; wherefore *some* of them must happen to be in the direction of the change going on in the Environment. Such will pass inspection; while all which have changed in other directions will be sifted out and destroyed. This process Mr. DARWIN calls *Natural Selection*. It certainly involves not only a *natural* but a *mechanical rejection* by the Environment. If, then, the variation is mechanical, as Mr. DARWIN seems to make it, we have a *mechanical* theory of Evolution; for it matters not how purposive the causes producing variation may in fact be, if they act without reference to the Environment, their effects upon *it* must be wholly *incidental* and *accidental*. Prof. C. F. PEIRCE argues that the *variations are absolutely accidental*, and Mr. L. F. WARD claims that they are accidental up to that point at which well-formed varieties are established. But Mr. DARWIN explains his own meaning of the *accidental* as applied to his system. He says: "Selection is the paramount power; yet its action absolutely depends upon what we in our ignorance call spontaneous or accidental variability. Let an architect be compelled to build an edifice with uncut stones fallen from a precipice. The shape of each fragment may be called accidental, yet the shape of each has been determined by the force of gravity, the nature of the rock, and the slope of the precipice—events and circumstances all of which depend on natural laws; but there is no relation between these laws and the purpose for which each fragment is used by the builder. In the same manner, the variations of each creature are determined by fixed and immutable laws; but these bear no relation to the living structure, which is

slowly built up by the power of selection, whether this be natural or artificial selection." But it does not matter, so far as the character of the results from the "pressure of environment" are concerned, whether they be *absolutely accidental* or only *incidentally accidental*, for either gives us pure unintelligent, purposeless mechanism.

Now, the variations occurring in living beings seem to be almost unlimited, both in number and direction; and while the considerations heretofore advanced show that they cannot be absolutely accidental, but that, on the contrary, each one of them must be purposely *caused*. I do not claim that they are *all* produced with the purpose in view of fitting them to the Environment. It seems, indeed, very clear to me that while many changes are so purposively produced, according to Prof. COPE's interpretation of LAMARCK, Mr. DARWIN was right in assigning a much larger number to unknown causes, wholly incidental and accidental to the Environment.

It is in place to notice next that Mr. DARWIN's system is reared upon a "sandy foundation" in this, that his *causes* of variation being unknown, and the variations almost infinite in number, for aught the theory informs us, the causes may be equally numerous. The causes underlie the system, and, when known,—as they are liable to become at any time,—they may roll from under, as sands from under an edifice. That is to say, no doctrine is ever satisfactorily explained and safely anchored while resting upon causes or phenomena which, though not yet understood, are subjects of investigation and liable any moment to be exposed in full daylight; for, when thus brought to view, they may be found in direct contradiction to the system reared upon them.

We have now found four supposed great factors in Evolution: a cast-iron Environment; a *Lamarckian* adjustment of organisms to such Environment (Purposive, as held by some, Non-purposive, as held by others); a *Darwinian* accidental adjustment to the

same; and Heredity. The *Lamarckians* accept the first, second, and fourth factors, and the *Darwinians* the first, third, and fourth. Most *Lamarckians* give the second interpretation to the second factor, which makes their doctrine equally mechanical and necessary with *Darwinism*.

It remains to be seen what results have been or may be accomplished by the working of these several factors. And having discussed *Lamarckian* principles, it is proper next, and most largely, to consider Mr. DARWIN's theory, after mentioning some preliminary considerations. One of these is that Mr. DARWIN helps out his doctrine largely by borrowing from *LAMARCK*; but in doing so he very naturally takes it at its usual non-purposive, mechanical interpretation. He nowhere, that I find, admits intelligent directivity into the plan of his system.

I would next remark on the illogical use Mr. DARWIN makes of the principle of domesticity. Because intelligent man, acting with a purpose to produce definite ends, has been able to produce great changes in domestic animals and plants, therefore, argues Mr. DARWIN, the unintelligent, undirected, and purposeless forces of nature can do the same and more. Is it replied that only in a few special cases has man ever tried to change the characters of a species, while in vastly the larger number of varieties he has had no such purpose in mind; I answer that it may be true that in the great majority of cases he had no definite intention to change the form of the species; nevertheless, he has in every instance of domestication entertained the intelligent purpose of adjusting the being to an environment of domesticity and worked to that end.

It may be noticed next that marks of utility, the search for which seems to fill out the life-labor of most evolutionists, are just as pregnant with meaning to the theistic evolutionist or *creationist*, as to the mechanical evolutionist. The latter says that variation having reached and taken hold on the particular

utility-mark, it was that *very thing* which carried it safely through the environment-mill, by reason of which it survives. The former says that utility shows design, purpose; shows that intelligent Life pressed and moulded it into utilitarian shape, to the end that it should not be sifted out by Environment.

Again, in Mr. DARWIN's Natural Selection there is no place for *prevision*. *There can be nothing anticipatory*. It is only the variations that are of *present utility*, that are *present adjustments to the conditions* of life, that the "pressure of environment" respects. A variation which is *only preparatory* to some further modification, which, if perfected, will in the future be a better and closer adjustment, is not *itself* in any better condition as regards the present "pressure," and in no wise more likely to be saved from the sifting now taking place by *reason of the fact* that it is *anticipatory* of something better. This principle covers an objection that has been urged against Mr. DARWIN's doctrine by many able thinkers, to wit: that it does not provide for the incipient production of organs before and up to the time when they become useful to the being in the struggle for life; for until such time they are strictly anticipatory, and will not be considered by the Environment.

Thus Prof. HUXLEY says: "The minute variations in which new species are supposed to have had their rise cannot be of any advantage to the individual in which they appear."

We are now prepared to advance to the consideration of the inquiry whether the factors recognized by Mr. DARWIN, to wit: Mechanical Environment, *Lamarckian* non-purposive adjustment to Environment resulting from Incidental Variation, and Heredity, are adequate to account for the evolution of living beings. And I think I shall be able to show that for many reasons, in many respects, and many particulars they are not.

SEXUAL ISOLATION.

The first objection I notice is one urged by many evolutionists. It is this: Since the underlying variations are wholly incidental to Environment, they occur in every direction, and therefore comparatively few in the direction of any particular aspect of Environment; therefore, in sexual crossing, it would be a great accident if two should meet, varying in the same direction; and the variations, according to the theory, being minute and great in number, it is not a supposable proposition that opposite sexes, varying in the same direction, would happen to mate the great number of generations through which the process must necessarily drag itself along. On the contrary, unless isolated in some way, the varying individuals would inevitably mate with the unvarying, or those varying in other directions, so that the points gained would be crossed out. Thus, Prof. MIVART remarks: "As by the theory there is a constant tendency to indefinite variation, and as the minute incipient variations will be in *all directions*, they must tend to neutralize each other" (*Genesis of Species*, p. 46). And again: "The chances for the repetition of the same variation of enough in succession to evolve an organ amounts to a number about ten thousand times as great as the number of waves of light that have fallen on earth in historical time" (*Ibid.* 65). Prof. LE CONTE says: "It is evident then, as Romanes claims, that natural selection alone tends to *monotypal* evolution. Isolation of some sort seems necessary to *polytypal* evolution" (*Monist*, vol. ii., p. 327). And Prof. LE CONTE goes on to state that in sexual reproduction some kind of isolation is necessary to "prevent swamping of varietal characters." But it is not seen how isolation can become a generally effective factor in "preventing the swamping of varietal characters" by sexual crossing; for, supposing a first minute variation, either there must be isolation *then* or it will

be lost ; and the same will be true as regards *every* succeeding variation ; so that there *must be as many successive isolations as variations*. But this is more than will be either claimed or admitted, except in the case of some great change, as in the instance of the celebrated Anton sheep, which was isolated with females by his owner, with the result of originating a short-legged breed. Of course if he and one or more ewes had been isolated by some natural impediment, such as being cut off on an island, a distinct breed would have been the result just the same. But that such complete isolation should follow so great an organic change would be a succession of contingencies so unlikely to occur that no scientific hypothesis could safely be based upon it. Nevertheless evolutionists have been casting about for a factor of isolation with which to reinforce Natural Selection ; and they think they have found it in a theory propounded by ROMANES and GULICK, and thus stated by Prof. LE CONTE : “*Physiological selection*, or selection of those varieties the individuals of which are fertile among themselves, but sterile or less fertile with other varieties and with the parent stock. This has also been called ‘*segregate fecundity*’ by GULICK, and ‘*homogamy*’ by ROMANES.” And again : “After the introduction of sex, it became necessary that the individuals of some varieties should be in some way *isolated*, so as to prevent the swamping of varietal characters as fast as formed by cross-breeding. In very low forms with slow locomotion, such isolation might easily take place accidentally. Even in higher forms, changes in physical geography or accidental dispersion by winds and currents would often produce *geographical isolation*, and thus, by preventing crossing with the parent stock, secure the formation of new species from such isolated varieties. But in order to insure in all cases the preservation of commencing species, *sexual isolation* was introduced or evolved, as I suppose, later, and, according to ROMANES, somewhat as follows :

“All organs are subject to variation in offspring, but

none are so sensitive in this regard as the reproductive organs: and these in no respects more than in relative fertility, under different conditions. Suppose then the offspring of any parent to vary in many directions. By cross-breeding among themselves and with the parent stock, these are usually merged in a common type, their differences pooled, and the species remain fixed or else advances slowly by natural selection along *one line*, as physical conditions change in geological time. But from time to time there arises a variation in the reproductive organs of some individuals of such kind that these individuals are fertile among themselves, but sterile or less fertile with other varieties and with the parent stock. Such individuals are *sexually isolated* from others, or *sexually segregated* among themselves. Their varietal differences of all kinds are no longer swamped by cross-breeding, but go on to increase until they form a new species" (*Monist*, p. 326).

Now, this is a beautiful theory, but it is very strange that the ingenuity which developed it did not perceive also that it will not bear a logical analysis. The character of isolation here must be the same as already examined; that is to say, each successive "varietal variation," however minute, must be followed and preserved by an isolation—there must be *as many isolations as there are "varietal variations"* to "prevent swamping;" and it does not avoid the necessity of the situation that these isolations are themselves *sexual* variations. But until we are prepared to accept the doctrine of purposive Vitality, these variations of both kinds must be considered as *accidental*, so far as their bearing on the evolution of species is concerned. Then, where do we stand? Just here: for each *accidental "varietal variation"* that is to be preserved by isolation, there must *accidentally* arise a *correlated sexual variation*. It is true that to speak of "*correlated accidents*" is to talk nonsense; for it is yoking together two terms directly contradictory of each other. Nevertheless, if there be anything in the

ROMANES theory at all, it is compelled to stand on this basis, or else on the doctrine of intelligent Vitality. But we have not yet seen the worst of the absurdity. Sexual isolation means the setting off to themselves of at least one of each sex. If this is done by variations which render them fertile between themselves and sterile with others, there must be simultaneous correlated sexual variations between the two isolated individuals. A male could not become fertile with one female and infertile with others, unless the *one* should differ sexually from the others, and that too in manner *correlated to the male*. Then, not only does the theory demand correlation between accidental "varietal" changes and accidental sexual changes but in each instance that there shall be correlation between two corresponding accidental varietal changes, and two *correlated* accidental sexual changes; or in other words, each step in Evolution demands a mutual correlation between four accidents. This is a preposterous demand on its face, putting the theory entirely out of court, and calling for some other method of isolating the variations in order to the holding of Natural Selection on its feet.

Prof. W. K. BROOKS has formulated a sexual theory, thus epitomized by Prof. LE CONTE:

"Brooks regards both elements as internal, and represented by the two sexes. The male represents the progressive, the female the conservative element. The one tends to divergent variation, the other to fixity of type by heredity. . . . In sexual union, and in the resulting offspring, the sperm-cell is the element which tends to divergent variation, and the germ-cell to fixity of type, through heredity. But again, it is believed that in many lower animals, especially insects, the high-feeding of the mother, and consequent good condition of the ovum, tends to the production of female offspring. It seems almost certain that in butterflies the sex is not yet declared in the caterpillar stage.

"In good times in the history of a species, when everything is prosperous, external conditions are fa-

vorale, and food is abundant, females are in excess and individuals are greatly multiplied. Under these conditions Evolution would be slow and uniform. But in *bad* times in the history of a species, when external conditions were unfavorable, not only would there be excess of males, but these through the influence of changing environment, as well as through the dominance of the male element, would be more than usually varied in character. Among the strongly divergent varieties thus formed, the fittest—i.e., those most in accord with the changing environment—would survive and leave offspring partaking of their character. We have already repeatedly said that the severer pressure of a rapidly changing environment determines correspondingly rapid changes in organic forms. It may do so in many ways; but according to Brooks, one of the most important ways is by determining an excess of the male element" (*Evolution and Religious Thought*, p. 244).

But Prof. BROOKS's theory does not seem to be supported by Mr. WALLACE's observations on polymorphism. He says: "By this term I understand the co-existence in the same locality of two or more distinct forms not connected by intermediate gradations, and all of which are occasionally produced from common parents. These distinct forms generally occur in the female sex only; and their offspring, instead of being hybrids, or like the two parents, appear to reproduce all the distinct forms in varying proportions. I believe it will be found that a considerable number of what have been classed as *varieties* are really cases of polymorphism." (*Nat. Selection*, p. 145.)

Again he says: "The phenomena of dimorphism and polymorphism may be well illustrated by supposing that a blue-eyed, flaxen-haired Saxon man had two wives, one a black-haired, red-skinned Indian squaw, the other a woolly-headed, sooty-skinned negress; and that instead of the children being mulattoes of brown or dusky tints, mingling the separate characteristics of the parents in varying degrees, all the

boys should be pure Saxon boys like their father, while the girls should altogether resemble their mothers. This would be thought a sufficiently wonderful fact; yet the phenomena here brought forward as existing in the insect world are still more extraordinary; for the mother is capable of producing not only male offspring like the father and females like herself, but also of producing other females exactly like her fellow-wife, and altogether differing from herself. If an island could be stocked with a colony of human beings having similar physiological idiosyncrasies with *Papilio Pammon* or *Papilio Orthenus*, we should see white men living with yellow, red, and black women, and their offspring always reproducing the same types; so that at the end of many generations the men would remain pure white and the women of the same well-marked races as at the commencement" (*Ibid.* p. 157).

It must be remembered also that in bees and ants there are dimorphic female forms, queens and neuters. It is also true that specialized neuters as workers, soldiers, honey-bearers, etc., are specialized females.

However, if a *true* theory, it is not perceived how it strengthens the doctrine of Evolution; for in the first place it needs to be shown how it came about that the two sexes acquired diverse and opposite tendencies; and next, that having them, they can without isolation avoid "swamping" all varietal advances by cross-breeding, just the same as if both sexes tended to cast variations. The most that can be counted on from such a theory seems to be accelerated variation in hard times and retarded variation in good times. It neither furnishes a cause for variation, purposive or otherwise, nor a theater for isolation until variations adjusted to Environment can become fixed. Prof. BROOKS himself seems to have abandoned the theory.

HEREDITY AND VARIATION.

Prof. LE CONTE says: "The fundamental reason for the introduction of sex is *the funding of individual*

differences in a common offspring, thereby giving to the offspring a tendency to divergent variation.” (*Ev. and Religious Thought*, p. 219). As has been shown, the characteristics of all his ancestors float in the stream of heredity on down towards the individual, their “individual differences” are “funded” in him, but it is not seen how this increases his tendency to variation, in a forward direction. All the variations brought down to him are within the limits of what the ancestry have reached, within the limits that past Environment has tolerated and what must have been to a degree an adjustment to the ancestral Environments. Every such variation must be clear atavism, a clear “crying back” and importing forward past characteristics.

Says M. ALFRED BINET: “Heredity is nothing but a preservative force; a memory of the species supposes an anterior power of acquisition. The sucking of the teat, which is one of the earliest hereditary acts of the human race, may be explained by heredity amongst the mammifers; but in order that that power may have been transmitted, it must have been acquired; and the acquisition must have taken place at the time of the formation of the mammiferous type.” (*Open Court*, p. 1934.) And Prof. COPE says: “Great obscurity has arisen from the supposition that natural selection can originate anything, and the obscurity has not been lessened by the assertion often made that these variations are due to inheritance! What is inheritance but repetition of characters possessed by some (no matter what) ancestor; and if so where did that ancestor obtain the peculiarity? The origin of variation is thus only thrown upon an earlier period.”—(*Origin of Fittest.*) Then the effect, to some extent, must be to call back the race to the average of the ancient lineage; it must be a conservative principle always counteracting any tendencies to variation in a forward direction or outside the limits extended, of the ancient Environments.

Therefore “the fundamental reason for the intro-

duction of sex" seems to have been just the contrary to that imagined by Prof. LE CONTE, to wit: to prevent "a tendency to divergent variation" and keep species true to their kinds by calling them back at every step strictly within the lines extended, which have already bounded off ancestral variations, thus to a degree balancing and correcting the tendencies to variations impressed by the "pressure of Environment."

INNATE TENDENCY TO VARIATION.

WEISMANN supposes that variation is to be accounted for by an innate tendency; DARWIN speaks of organisms, "becoming plastic and tending to depart from the parental type;" and Prof. OWEN says: "An innate tendency to deviate from the parental type is the most probable nature, or way of operation, of the secondary law, whereby species have been derived from one another." An "*Innate tendency*" would need to be accounted for as much as any other fact of life; its assumption explains nothing; but passing over this fact, the tendency, if such there be, must either be directed towards the Environment, *which presupposes intelligent directivity*, or it must be in any of several or many directions. If the former, isolation is not needed, if the latter the same difficulties arise in securing isolation as before; that is to say, either it must be the result of *purposiveness*, or else, of parallel and reciprocal correlations between at least four lines of accidents. Indeed, we shall find this difficulty of parallel correlation of accidents prominent in the attempted solution of very many evolutionary problems on the Natural Selection hypothesis. The trouble all the way is, as we shall find, that Natural Selection attempts an intelligible creation without intelligence, without purpose, without direction; on mechanical principles only; and such a creation refuses to be educated in that way; intelligent results refuse to appear out of wholly accidental processes; they deny any such parentage; they say, "each after its kind;" they affirm that the only

progeny Accident can bring forth is confusion and chaos, while plan and adjustment can and must be born of intelligent purpose only.

EACH SPECIES FOR ITSELF.

Mr. ROMANES says: "Amid all the millions of mechanisms and instincts in the animal kingdom there is no one instance of mechanism or instinct occurring in one species for the exclusive benefit of another species, although there are a few cases in which a mechanism or instinct that is of benefit to its possessor has come also to be utilized by other species." "Every species is for itself, and for itself alone, an outcome of the always and everywhere fiercely-raging struggle for life." And if Natural Selection be a true doctrine, the proposition must be correct; for, a device in one species wholly for the benefit of another, could in no way tend to fit the former to meet the "pressure of environment." If, therefore, instances can be found in which, contrary to the assertion of Mr. ROMANES, one species does work for another without benefit to itself, it stands as a contradiction to the doctrine of Natural Selection. Mr. DARWIN himself says: "Natural Selection acts exclusively through the preservation of profitable modifications of structure."

FOUR ANTAGONISTIC PRINCIPLES.

We find, then, *four* great principles or facts which Natural Selection *must avoid* to become acceptable. (1) It must avoid *prevision or anticipatory action*. If in any organism there be found, not present utility, but preparation for future use, it can not have been the product of Natural Selection; for, it must have been designed; whereas, Natural Selection is the resultant of a succession of accidents only. (2) It must avoid *correlated processes*; for, *accidents* can no more be correlative to each other than they can be anticipatory. (3) The requirements of Natural Selec-

tion must in every instance be *not harmful, but beneficial to the species in which they occur*, for it is only on the penalty of being so, that they fall withiu the preservative power of Environment. (4) The changes in the organism must not only be beneficial to the individual or the race, but they must be so *adjusted to the Environment that by its sifting, they can be saved and made permanent*. They must not leap over Environment, or bound from an Environment of one character to another of other character, without means of intermediate connection and gradation. It is important that the pretensions of the doctrine be examined in the light of all these principles.

FIRST LIFE.

Mr. DARWIN does not attempt to carry his theory back of earliest life ; and, it is very clear that it can not be so carried, for although before life began there was of course an Environment,—conditions of physical natnre ready to *press* into form any life that might appear, or rather reject and eliminate any, which appearing, should not come adjnsted to the Environment ; yet the other two factors of *Darwinism*, Variation and Heredity, must have succeeded and not preceded first life. So the theory stops entirely short of the greatest mystery of all,—how non-living matter first came to put on the living form. Of course, here, as everywhere, the three fundamental doctrines put in appearance ; Chance, Necessity, and Intelligent Purposive Creation ; and here also, as all along, the argument urged as between these three fundamental doctrines holds good.

Profs. STEWART and TAIT, unlike most evolutionists, recognize a break in the law of Continuity here ; that is, the necessity for supposing creative Power in the production of first Life.

But in whatever way Life originated, it must at the very beginning have been endowed with certain capacities to have made it Life at all, or to have enabled

it to make any advance whatever. Amongst these must have been the capacities for growth and reproduction; and these presuppose the faculties of feeding, digesting, and assimilating other material, while the processes of digestion and assimilation presuppose profound chemical analyses and syntheses. And beneath all, these processes individually and collectively presuppose some degree of sentiency: where nutriment was only imbibed, perhaps what we know as vitality only; but where, as in the Amœba, the creature had to go out and *hunt* for food, there must have been some degree of what we call mentality. No theory can deny some degree of sentiency in the latter instance.

Whatever doctrine, then, is brought forward to account for first life must be prepared to account for some degree and some character of feeding, digesting, assimilating, growing, multiplying, and knowing; and the *Darwinian* or any other system of life-evolution must come after, and be superimposed upon these faculties. But more than this, the capacity for growth included some *form* of growth, some *figure* to be filled out by the deposition of assimilated particles of matter at particular points. Let us suppose that in earliest life the being was homogeneous in structure throughout; then, the growth—material must have been throughout of the same homogeneous character. Now, how did the first differentiation, the first rudimentary nucleus or nucleolus within and the first pellicle without, come to be formed? Evidently there must also have been at the very first, with the *capacity* for variation, minute, but in all directions, a tendency to some definite manner or *form* of growth, some *plan* to be filled out. Then, the very first developments of life-processes must, not only have preceded and anticipated Natural Selection, but must have involved some degree of sentiency, some plan however low, some object to be attained to, some purpose to be subserved. So, many of the profoundest of all Life's mysteries must have preceded any possible system of Natural Selection. Before it, must have been sentiency and plan, the facul-

ties of feeding, digesting, assimilating, growing and multiplying, and also the principles of Heredity and Variation. All these underlie every doctrine of Natural Selection; any true philosophy of Life must begin with them, and Natural Selection as well as any other system of Evolution must find its basis, its reason, and its justification in them. Natural Selection itself is but a surface doctrine overlying the deeper principles of Life.

REPRODUCTION BY FISSION.

Darwinism, while probably admitting that the first variations were *caused*, must at the same time hold that so far as the end or purposed transformation or advancement of the being was concerned, they were accidental; for as we have seen all along, the alternative is *purposiveness*, which is entirely incompatible with Natural Selection. Then right at the outset we have variations, minute and numerous, in all directions; and *some*, being towards adjustment to Environment, are saved. But how saved? This inquiry takes us back to Reproduction. It has been noticed that first life must have possessed the capacity of Reproduction. We may suppose it to have been the simplest known or imaginable, by division or fission. And this process, however simple, presupposes Heredity; that is, that the new beings shall be like the old, both in material structure and form, as well as in sentiency, plan, and mode of action.

First life being now launched into existence, with sentiency however low, together with the capacities of growth by feeding, digestion, and assimilation, Reproduction, Variation, and Heredity, we are prepared to see it go on and evolve all of organic nature, provided only it can all be accomplished without *prevision*, without *accidental correlation*, without one race working specially for another or making useless structures, and without leaping over Environment. But whether under these limitations, even with so great a

start in first principles as first Life must have afforded, Natural Selection can have constructed the organic world? is the question before us.

REPRODUCTION BY BUDDING.

The first great enigma to be solved is a radical advance in the mode of reproduction, thus briefly described by Prof. LE CONTE. "*Fission*. An organism of the lowest kind grows and divides into two. Each half grows to mature size and again divides, and so on indefinitely. In this case there is no distinction between parents and offspring. Each seems either or neither.

(2) "*Budding* growth-force concentrating in one part produces a *bud*, which continues to grow and individuate itself more and more until it separates as a distinct individual. This is a higher form than the last, because in this case the individual is not sacrificed. Only a small part separates and the separated part is in some sense an offspring. We have therefore for the first time the distinction of parent and offspring" (*Monist*, vol. ii., p. 323). Now in this process it is evident that there were prevision and preparation; for until the *bud* was sufficiently developed to be capable of individual life it could not have been beneficial either to the parent individual or to the race. But by the theory the development of any organism must have been by the slow and tedious presentation to Environment of accidentally occurring minute variations, most of which were sifted out and destroyed, while an occasional one fitted the meshes of the great machine, passed through, and was saved. And this being repeated thousands of times, the organism was perfected. However, as seen above, this could not have been possible in the development of the *bud*; for the variations tending in that direction would have been no adjustment to existing *Environment*, because possessed of no present utility; that is to say, these variations could only have been anticipatory of future utility.

Anticipation and accident are absolute contradictions ; therefore, accident was absolutely excluded in bud-evolution ; but Natural Selection is founded upon accidental variation. As a final conclusion of the argument, *Natural Selection had nothing to do with the change of the mode of Reproduction from Fission to Budding* ; it was a previsional and anticipatory change brought about for the future benefit of organic nature through some purposive agency. It is submitted that this argument alone, considered exhaustively and without prepossession or prejudice, absolutely disposes of the doctrine of Natural Selection.

SEX.

The next great step in the line of evolution was the development of sex. Prof. LE CONTE goes on to describe the process pursued in attaining that end as follows :

(3) "By the law of *differentiation and localization of functions*, the bud-forming function is next relegated to a special place, and we now have a bud-forming organ. (4) By another general law, the law of *interior transfer*, the bud-forming organ is next transferred for greater safety to an interior surface, and thus simulates an ovary, although not yet a true ovary or *egg-forming organ*. Examples of all these steps are found among existing animals.

"Thus far Reproduction is non-sexual. But now comes the great step—i.e., the introduction of sexual reproduction in its lowest forms. (5) This simulated ovary or bud-forming organ becomes a true ovary or bud-forming organ ; or rather, at first, a combination of ovary and spermary. The same organ prepares two kinds of cells, male and female, germ-cell and sperm-cell, which by their union produce an egg which develops into an offspring ; and not only an offspring in the sense of a separated part of a previous individual, but in some sense a new creature, the creation of a *new individual*. There is an enormous difference and even

contrast between this and all preceding modes. In non-sexual modes one individual becomes two; in this, two individual cells unite to form one.

"Thus far we have given only the lowest form of sexual generation. The two sexual *elements* only, germ-cell and sperm-cell, are separated from each other, but not yet even the sexual organs, ovary and spermary, much less the sexual individuals, male and female. (6) The sex-element-forming function is next differentiated and localized in two different organs, ovary and spermary, but not yet in two different individuals. This is hermaphroditism, so common in plants and in lower animals. (7) The already separated sexual organs are next localized in different individuals, and we now have male and female individuals. This is the case in many plants and in all the higher animals. (8) And finally these male and female individuals become more and more diverse in character" (*Monist*, p. 323).

The first remark upon the above very clear elucidation of the subject is that Prof. LE CONTE should have accounted for his "*laws of differentiation and localization of function and interior transfer*." If there be any such laws, they must either have been evolved by living beings themselves or else come with them into first existence along with the other faculties named. If evolved, when and how?

But passing this, while it is certainly true that the localization and transfer to interior points of the budding function proved in fact to be anticipatory of sexuality, I am not prepared to say that in particular instances both processes may not have been beneficial, and therefore that accidental variations made in that direction may not have been preserved by Environment. Therefore, while not conceding, I am not prepared to deny that, so far as the principles we are now considering are concerned, these two steps in the way towards sexuality may have been the result of Natural Selection. But the next step is exceedingly different, for there two cells were simultaneously and

reciprocally transformed in material structure and function to unite in an entirely new function and process which could only have been of future utility. And remember such reciprocal transformation must, according to Natural Selection, have been by accidental variations, saved by Environment. That is to say, there must have been not only anticipation by accident, but *anticipation by two parallel lines of correlated accidents.*

This is a point in this discussion worthy of very great consideration, for here we have arrived at what Prof. LE CONTE well designates "an enormous difference, and even contrast, between this and all preceding modes." And well may he call it "the creation of a new individual;" for, as he says, in the former modes "one individual becomes two; in this, two individual cells unite to form one." It is an absolute inversion of the a-sexual modes of reproduction. Two cells are produced, not fitted like the former germ-cells to become buds, but with altogether different capacities and potentialities, to wit: one by the aid of the other, to become a seed or egg, and thence a mature individual; and the other, with the capacity to lend to the former, by coalescing with it, some principle or potentiality which shall enable it to grow into an embryo individual, seed, or egg. But until the two cells are fully endowed with their respective potentialities, and then with means to come together, so that in the coalescence a new germ-cell shall be formed, all the modification suffered is and must be only preparatory; for *it cannot be presently beneficial.* And more than this, not only must the new germ-cell be formed by the meeting and coalescence of the mature old germ-cell and sperm-cell, but the functions of the parent being must have been so modified and turned into new direction as to nourish and build up seed or egg instead of bud. And still more, it must have been so fitted and adjusted to Environment that it grew into a mature individual capable of repeating the process. And another thing, in such seed or egg

must have been placed the principle of Heredity, like as it must have been in reproduction by fission or budding. And one thing further, there must have been placed in it, as in the bud, the principle of Life, whatever that may be. And all this must have been by accidental variations, saved by Environment, and all before any of the variations could have been of any benefit. It is therefore doubly impossible for Natural Selection to account for sexuality, since both prevision and reciprocal modification are involved and to be accounted for. And the latter difficulty does not end with the mere primal establishment of sexuality, but runs all along the line, occurring at every step, since every change in sexuality, from first to last, involves reciprocal changes in two parallel lines, male and female. Therefore, there has not been a step in sexual development, from its incipiency to the present, but what has squarely contradicted Natural Selection in two aspects : anticipation of future benefits and correlation of parallel lines. Every step has involved these two fundamental principles, both of which are always hostile to Natural Selection, because utterly incompatible with accident, and more than that, because always and necessarily involving prevision and purpose.

I might well rest the argument here with a challenge to the doctrine of Natural Selection to extricate itself from this logical dilemma ; but there are many other interesting facts in biology which show out its inadequacy with equal clearness, and I proceed.

NEUTER INSECTS.

Attention will next be directed to one of the most puzzling problems in biology, to wit : the evolution of a neutral form of female in bees, wasps, and ants, and neutral forms in both sexes of termites. How can Selection account for this phenomenon ? But first, what is the phenomenon to be accounted for ? It is this : the casting off of progeny for successive gen-

eration with characteristics of form, organization, habits, and instincts unlike those of either parent or of any ancestor of either parent. At some time in the past honey-bees, for instance, were simply males and females; but one or both of some one or more pair of bees at some time varied from the normal condition in the matter of Heredity, in such manner as to breed, not only normal male and female progeny, but also abnormal forms, varying in many particulars from all ancestral forms and incapable of procreation. But the normal progeny inherited the capacity of reproducing the three sexual characters; and so on, from generation to generation. But these variations must have been of such significance that the second generation, including the normal and abnormal individuals, were perceptibly better adjusted to the Environment, and therefore more likely to survive in the struggle for existence. And this must have gone on until another or other variations of the same kind occurred in the same direction, to be saved in the same manner. Now, let us go over the process again: (1) A first variation is in the capacity for transmission. (2) As a result of this changed capacity, individuals on the road to a third sex are bred. (3) The family, by reason of the addition of this third estate, becomes better fitted to survive, and is saved by Environment. (4) The changed capacity of transmission is transmitted down the line of posterity. (5) Other like changes in the same direction successively occur and are saved in the same way, until finally the third form, with all its modifications, is fully established. As elsewhere, the variations here must, of course, be accidental. If one accident could be more singular than another, it would seem remarkably singular that by accident a new-born being should be not different itself in any tangible character, but only in the capacity of impressing differences on the next generation. And, in fact, Mr. DARWIN's accidents are not, as we have seen, absolute, but only relative accidents,—relative to adjustment to Environment,—so that, in

fact, they are really *caused* and to be accounted for as causal phenomena. I think that in this instance *Darwinians* may be fairly called upon to account for phenomena so strange, particularly when the remarkable instincts of bees and ants are considered, all of which, by the theory, must have arisen from transmitted relative accidents. The theory says this series of variations was caused, but not with any view or purpose of developing a neuter form; that such form is only an incidental outcome of such series of caused variations. Then what were the causes of the phenomena, and with what view and purpose were the variations made? It is clear that one of three possible solutions can be presented: either they were caused for this particular purpose, they were caused for some other definite purpose, or else they were aimless, purposeless. The first solution gives us a purposive creation, in contradiction to Darwinism; the third is "back to chance," as Prof. PEIRCE would have it; the second is Mr. DARWIN's doctrine, but, as elsewhere remarked, it places the system on a very unstable foundation, resting on unknown causes, directed by unknown purposes. In the phenomena before us, Natural Selection argues that in numerous species of ants, bees, termites, and wasps, unknown causes, directed towards the accomplishment of other purposes entirely, have incidentally produced series of changes all in the same direction, which Environment has seized upon and saved up in the production of a third sex. And these variations are not in the line of modifications of any individual, but only in enabling it to transmit hereditary characteristics which it does not itself have and none of its ancestry ever had.

But the point I wish to make is that it can not be seen how the incipient changes in the worker-bee could have been of such significance and benefit to the family as to procure its safety in the struggle. In other words, it seems that it must have been clearly a case of provision, and therefore not of accident in any sense, and not in any way dependent on Natural Selec-

tion. It is said by specialists that worker-bees have the instinct and capacity to change the neuter grub into a queen-bee by peculiar feeding and management. This is a wonderful manifestation of wisdom and skill. It is inherited, but not from any ancestor who ever possessed such capacities, but from those who had only slowly acquired the faculty of transmitting instincts and capacities which neither they nor any ancestors of theirs were ever endowed with. Does it seem within the range of possibility that by accident merely,—accident relevant to the end to be obtained,—the mother-bee could have acquired the potency to give to the workers the instinct to change the whole character, physical, instinctive, and physiological, of another embryo?—a change so profound as to give to what would have been only a *mere* sterile neuter, not only the faculty of reproduction, but of transmitting the like faculties to those possessed by itself? And as we study the differences between the three sexes physically, physiologically, and instinctively, as well as the varied capacities of the worker-bee, and the wisdom and skill displayed in its numerous offices of gathering sweets, secreting and storing honey and wax, building its comb, rearing and feeding the young, defending the hive, etc., the thought that all this is but an accumulation of fortunate accidents, not shared by any ancestor, but transmitted by a whole line for certainly 2,000, perhaps 100,000, generations, as capacities to endow certain offspring with these wonderful instincts and faculties, is staggering to the intellect. We want something more than theory and assertion for the predication of the claim that so much and such profound prevision and intelligent action is but the resultant of a succession of beneficial accidents struck upon by the unprocreative part of the community.

It is found that varieties grow up amongst honey-bees as amongst other animals, that the worker form changes from age to age and locality to locality in color, form, shape and size of organs, habits and instincts; and evolutionists talk as glibly of these

changes being the results of Natural Selection, as if no difficulty barred the way. Thus Mr. ROMANES, speaking of bees conforming their honey-making habits to varying domestic conditions, remarks: "It is evident that if from any change of environment, such accidental conditions were to occur in a state of nature, the bees would be ready at any time to meet them by intelligent adjustment which, if continued sufficiently long and aided by selection, would pass into true instincts." Now, when the worker acquires the beginnings of a new instinct, is it cast back by some principle of back-working heredit on the mother-queen, who then impresses it as a forward-working heredity on her progeny? If not, how do the gains of one generation of workers become impressed into habits and instincts in succeeding generations? The fact is, Natural Selection is entirely at fault here; for this phenomenon can be accounted for by nothing else than preision. The change must originate in the ancestry, in the fertile forms of the insect; *they* must first gain the capacity of casting a worker progeny fitted to the Environment and then transmit this capacity along down the line; a capacity of giving new instincts to the worker progeny, instincts which they themselves do not have and never acquire.

HONEY-BEARING ANTS.

Of all the wonderful instincts and transformations of organs displayed by nenter insects, perhaps that of the honey-bearer ant described by Rev. Dr. McCook, who studied the creature in Colorado and New Mexico, is the strangest and most interesting. They excavate chambers connected by galleries in a friable sandstone, leaving the roofs rongh and corrugated to furnish foot-hold for the "honey-bearers," who cling thereto to the number of about thirty in each chamber, and three hundred to a whole nest. The abdomen of the ant is converted into a honey-sack, the whole internal econ-omy of the body being transformed for this purpose,

and all the organs of the abdomen, viscera, nerves, veins, and arteries having disappeared, leaving only a thin transparent skin which becomes distended with honey to the size of a pea.

The twigs of a certain scrub oak in the neighborhood are covered with galls which distill minute drops of sweetness. This the worker-ants lick up, carry to the chambers, and eject into the mouths of the honey-bearers, thus making them receptacles for the winter's store. When a hungry ant demands his dinner the honey-bearer, by a contraction of its abdominal muscles, forces from its mouth minute globules of honey which the other ant licks up.

Now here, in addition to the difficulties we have already encountered in discussing the development of neuters, we have two other problems of immense moment to consider: First, a wonderful correlation between the instincts of the worker on the one hand, and the instincts and organic transformation of the honey-bearer on the other; and next, a correlation between functions, habits, and instincts of the ant colony on the one hand, and the habit of the scrub-oak on the other. And this habit, it must be remembered, is the result of a correlation between the oak and the gall-fly, which deposits its egg in the twig of the bush, the latter not only giving protection to the grub of the fly but honey to the ant, without itself being in anything benefited thereby. And so the queen-ant, without either she or any of her ancestry ever having had such forms or instincts, herself transmits to the worker the instinct of gathering honey from the oak-galls, and to the honey-bearer the instinct and wonderful organic transformation which capacitates it to become a stationary honey-jar.

DARWIN'S THEORY OF NEUTERS.

M. POUCHET thus states Mr. DARWIN's attempt to explain the Evolution of the worker-bee: "Let us suppose that a certain number of neuters may have

brought from birth a favorable organic modification into a community of insects, and that by this the community has prospered ; the males and females who have produced these neuters will then have by them the greatest possible chances of prosperity. It may happen thenceforth that they transmit to their descendants what they had themselves—that is to say, the property of procreating neuters having the same favorable organic modification, and we thus fall back into the common process of Natural Selection.” That M. POUCHET should call this “confuting this great objection to neuters” shows what flimsy stuff often passes as conclusive argument in favor of Evolution ; for a little thought will show that this is not even a plausible pretense to an explanation, since it assumes the very facts demanding explanation, assumes that certain “males and females” had the property of procreating neuters “having favorable organic modifications,” and that they transmitted this “property.” The demand is that Natural Selection shall explain first how these assumed “males and females” came by the “property of procreating neuters,” with not only their “organic modifications,” but their much more wonderful instincts ; and next, how they arrived at the capacity of transmitting forms and instincts which they did not themselves possess. Mr. DARWIN here failed to distinguish between an assumption and an argument or explanation. But he gives an illustration of his supposed argument : “There are oxen with horns a little longer than those of the bulls and heifers that produced them. ‘Well,’ says DARWIN, ‘pair together, by attentive selection, the fertile descendants of the bulls and heifers that produced the oxen with longer horns, and before long you will have a race of oxen in which length of horns will be hereditary, although the animal is sterile.’” Now it seems not to have occurred to these gentlemen that it makes an immense difference in the argument that the bees are sterile by nature, whereas the oxen are rendered sterile by man. But passing this, Mr. DARWIN repeats the great fallacy of

his pigeon argument in assuming to illustrate the blind mechanical processes of an unintelligent nature by the results of man's intelligently directed conduct. To produce the long-horned oxen, we are to "pair together by attentive selection" the proper progenitors. But who "paired by attentive selection" the male and female bees which first "procreated the favorable neutrals?" Is it not clear that Mr. DARWIN's illustration entirely abandons the principles of Natural Selection by introducing intelligence into the problem?

METAMORPHOSIS.

Another subject of absorbing interest is that of the metamorphosis of animals. In the frog, for instance, it is supposed that there was a time when it was a fish, and then a tadpole with gills and tail, but no lungs or legs. But there came a later time when, before mating, it commenced little by little to change off gills and tail for lungs and limbs. These modifications were transmitted and went on from generation to generation, until it at last became a fully matured frog. Now, I contend that prevision and preparation are manifest here, and that therefore Natural Selection cannot account for the transformation; for evidently, the earliest rudiments of limbs and lungs could have been of no *present* value, but only of future benefit to the animal; just as now the tadpole is for the present no better off for its incipient limbs, but only prospectively so. They do not, at present, afford any adjustment whatever to a land habitat, and therefore can afford no present protection or benefit whatever. Nevertheless, we can imagine each stage of the transformation to have once been the mature stage of the animal; though we can not imagine what advantage could possibly have accrued to the tadpole from the use of half-formed limbs, and lungs never completed. If such was ever its mature state, it could only have been preparatory to a higher progress, as has already been argued.

But the difficulty thickens when we attempt the discussion of the metamorphosis of insects. Here, as with the tadpole, ineipient wings, legs, and antennæ could only have been previsional ; they could not in their earliest development have been of any present use, and therefore could not have been the products of Natural Selection. Nor can we suppose that the mature stage of the butterfly was ever that now presented by the pupa, inert and motionless in a cocoon. The mature state in some past age may have been that of the caterpillar, but that stage could not have passed as a mature insect through the chrysalis stage. If the caterpillar gradually grew wings and butterfly legs, it must have been a direct transformation. But as it is the mature stage which reproduces the species, how then could the pupa form ever have been inherited ? I answer that it must have been in the first instance like the prevision of the queen-bee transmitting to the worker faculties she nor any ancestor of hers ever possessed. It must have been either that the caterpillar transmitted to its offspring the faculty of becoming not only another caterpillar like its ancestry, and then of going on and becoming what none of its ancestry ever were—first pupa and then butterfly ; or else, after the caterpillar had developed directly into the butterfly, the latter must have transmitted what neither it nor any ancestor of its ever had—the power of passing from the caterpillar stage *through the pupa stage* into the butterfly stage. Here we have the two principles in view : the prevision of metamorphosis as illustrated in the case of the frog, and the prevision of throwing unpossessed and uninherited endowments as illustrated in the production of the worker-bee. Indeed in the bee we have the former principle once, and the latter twice, to wit : first as a factor in the metamorphosis of all the swarm, and then again in the production of the workers as so fully explained. So metamorphosis can not be explained on Darwinian principles. On the contrary, it is directly antagonistic thereto.

ALTERNATE GENERATION.

The same argument holds good as regards alternate generation, in which, in some of the lower animals, as many as ten generations of different forms and habits succeed each other before coming around again to the mature or last stage of the animal. Here each prior stage is but preparatory to the next, and all preparatory to the last. So it is all pre-*vision*, and all without room for Natural Selection, as the history of two or three of the innumerable species will attest.

Says Prof. AGASSIZ: "There is also another series of cases in which the offspring not only do not resemble the parent at birth, but, moreover, remain different during their whole life, so that their relationship is not apparent until a succeeding generation. The son does not resemble the father, but the grandfather; and in some cases the resemblance appears only at the fourth or fifth generation, and even later. This singular mode of reproduction has received the name of *alternate generation*.

"Among the numerous animals which inhabit stagnant pools in which fresh-water shells, particularly *Lymnea* and *Paludina*, are found, there is a small worm known to naturalists under the name of *Cercaria*.

"If we watch these worms, which always abound in company with the shells mentioned, we find them after awhile attaching themselves, by means of their sucker, to the bodies of the mollusks. When fixed they soon undergo considerable alteration. The tail, which was previously employed for locomotion, is now useless, falls off, and the animal surrounds itself with a mucous substance, in which it remains nearly motionless, like the caterpillar on its transformation into the pupa. If, however, after some time we remove the little animal from its retreat, we find it no longer a *Cercaria*, but an intestinal worm, called *Distoma*. The *Distoma*, therefore, is only a particular state of the *Cercaria*, or, rather, the *Cercaria* is only the larva of the *Distoma*.

"What now is the origin of the Cercaria? At certain periods of the year we find in the viscera of the Lymna (one of the most common fresh-water mollusks) a quantity of little worms of an elongated form, with a well-marked head, and two posterior projections like limbs. The cavity of their body is filled by a mass of other little worms, which a practised eye easily recognizes as young Cercariæ. These little embryos increase in size, distending the womb which contains them, and which seemingly has no other office than to protect and forward the development of the young Cercaria. It is, as it were, their living envelope. On this account it has been called the *nurse*.

"When they have reached a certain size, the young Cercariæ leave the body of the nurse and move freely in the abdominal cavity of the mollusks, or escape from it into the water, to fix themselves, in their turn, to the body of another mollusk, and begin their transformations anew.

"But this is not the end of the series. The nurses of the Cercaria are themselves the offspring of little worms of yet another kind. At certain seasons we find in the viscera of the Lymna worms somewhat like the nurses of the Cercaria in shape, but rather longer, more slender, and having a much more elongated stomach. These worms contain, in the hinder part of the body, little embryos, which are the young nurses. This generation has received the name of *grand-nurses*.

"We have thus a quadruple series of generations. Four generations and one metamorphosis are required to evolve the perfect animal; in other words, the parent finds no resemblance to himself in any of his progeny until he comes down to the great-grandson.

"Among the Aphides, or plant-lice, the number of generations is still greater. The first generation, which is produced from eggs, soon undergoes metamorphosis, and then gives birth to a second generation, which is followed by a third, and so on; so that it is sometimes the eighth or ninth generation before the perfect ani-

mals appear as males and females, the sexes being then for the first time distinct, and the males provided with wings. The females lay eggs, which are hatched the following year to repeat the same succession. Each generation is an additional step towards the perfect state; and, as each member of the succession is an incomplete animal, we cannot better explain their office than by considering them analogons to the larvæ of the Cercaria—that is, as nurses." (*Principles of Zoology*, p. 159).

MAMMALIAN REPRODUCTION.

In the evolution of the mammalian type of life we find a striking instance of reciprocal development between the foetus in the uterus and the organs and functions of the mammae. It is now, and must in the first instance have been, a long series of parallel correlations and preparations, each for the other. The young mammalian could not have survived without nursing, and the organs and functions of the mammae were useless until after the birth of the young. So there was necessary correlation in the development of the foetus, and both correlation and preparation on the part of the mammae. But, as so often remarked, neither correlation nor preparation are compatible with accident; and therefore, mammalian reproduction must be accounted for in some other way than by Natural Selection.

MARSUPIAL REPRODUCTION.

A very similar fact occurs in marsupial development.

Mr. MIVART says: "The pelvis has two elongated bones extending upward from the superior margin in front. These are called marsupial bones, and lie within the flesh of the front of the belly. The cremaster muscle is attached to each marsupial bone, and thence stretches itself over the inner or deep surface of the

adjacent mammary gland. At birth the young kangaroo is scarcely more than an inch long, and cannot suck. The mother therefore places it upon one of her long and slender nipples, which enters its mouth, and the mother then, by means of the cremaster muscle, squeezes her own milk-gland and so injects milk into the young, which would thus be infallibly choked but for a noticeable peculiarity of its structure, admirably adapted to the circumstances of the case.

"In man, and almost all beasts, the windpipe opens into the floor of the mouth, behind the tongue and *in front* of the opening of the gullet. Each particle of food, as it passes to the gullet, passes over the entrance to the windpipe, but is prevented from falling into it by the action of the epiglottis, a small cartilaginous shield which ordinarily stands up in front of the opening into the windpipe, bends back and comes over that opening just when food is passing, and so at the right moment prevents food from going the wrong way. But in the young kangaroo, the milk being introduced, not by any voluntary act of the young kangaroo itself, but by the injecting action of its mother, it is evident that, did no special provision exist, the young must infallibly be choked by the intrusion of milk into the windpipe. But the upper part of the windpipe is so elongated that it rises right up into the hinder end of the nasal passage, which embraces it, giving free entrance for air from the nostrils into the windpipe by a passage shut off from the cavity of the mouth while the milk can pass freely to the gullet along each side of the elongated larynx." (*Pop. Sci. Month.*, Feb. 1876, p. 409.) Here are numerous anatomical and physiological arrangements made in anticipation of the birth of the young, while the gestation and birth of the latter are anticipatory of the contrivances. In the mother are the pouch, the marsupial bones, the cremaster muscle, the long teats and the mammary glands, together with the instinct which leads her to house and feed the young, while in the latter is the elongated larynx, the absence of either

one of which would have rendered all the others nugatory ; each one was anticipatory of all the rest and all the rest anticipatory of each one. That is, we have here no less than *seven lines of reciprocal and prearranged accidents*, in which the utility of any one of them depended upon the contemporary development of all the rest ; and more than that, where none of them could have been beneficial in their first beginnings.

POISON FANGS AND STINGS.

Another case of correlated organs and functions is that of the poison and hollow fang of noxious serpents. The one could have been of no utility without the other. The hollow fang hinged and lying back on the jaw with muscles arranged to throw it up instantly, is exactly correlated to and made for the sack of poison at its roots, so arranged that the same pressure which throws up the fang forcibly drives the poison through it ; and the arrangement shows wonderful reciprocal adaptation. Think of it ! A chemically elaborated venom distilled from the reptile's ordinary animal food, secreted in a sack attached to peculiar muscles at the root of the fang, and all developed by tedious variations saved up by the Environment, —but saved up how ? Until there should be a hinged hollow fang with appropriate muscles attached, it could have been of no use, while any such fang could have been of no use prior to the distillation of the sack of poison. Therefore, each was preparatory to the other ; they were developed in parallel reciprocal lines, each anticipatory of the other ; and, if by Natural Selection, then by *two parallel lines of mutually anticipatory and correlated accidents*.

There is precisely the same character of phenomena liable to the same objection and explanation in the matter of the stings of insects and the poison ejected through them ; only here the contrivances for driving the sting into the enemy and forcing the poison into

the wound are much more complicated and wonderful, and by so much the more is the provisional character of the reciprocal organs made evident. Prof. N. L. FAIRCHILD says: "In the sting of the honey-bee we see an apparatus beautifully contrived to enter the flesh of an enemy; two spears finely pointed, sharp-edged, and saw-toothed, adapted for piercing, cutting, and tearing; the reversed direction of the teeth gives the weapon a hold on the flesh, and prevents it from being readily drawn out. Here is an elaborate store of power for the jactation of the javelins, in the numerous muscular bands; here is a provision made for the precision of the impulse; and finally, here is a polished sheath for the reception of the weapons. All this is perfect, but something still is wanting. This is the poison, which has also a complex apparatus for its secretion and ejection. . . . Near the lowest point in the animal scale we find an apparatus exceedingly complex and efficient. This is the "netting threads," "lasso-cells," or *cnidae*, which give the hydra, jelly-fish, and polyps their power of stinging. They are also possessed by the crinoids, some naked sea-snails, and sea-worms. Like many others weapons, they are used to subdue prey as well as to expel enemies. The instrument consists of a hollow filament, coiled in a sac, the whole of microscopic size. The sacs are commonly on the surface of the tentacles and other free surfaces of the body. In other species they are collected in thread-like magazines which are shot out of the body-walls. Upon irritation this hollow thread is thrown out of the sac to a great length by eversion. It is turned inside out and then exposes a barbed surface. They penetrate the soft tissues of the animal attacked and convey a poison fatal to small animals." Here, too, the elaborate stinging apparatus would have been useless without the poison, and the apparatus for the chemical distillation of the poison useless without the stinging apparatus. *Each was provisional to the other.*

SPIDERS.

The spider furnishes another illustration of these principles. To enable it to take its prey it has first secretive organs for the substance of its web, next the function of secreting this peculiar substance, next its wonderful spinning organs, next the adaptation of its feet to the spinning and handling of the threads, and then the instincts of spinning, of weaving the web, and of taking its prey : certainly as much as three organic, one functional, and three instinctive adaptations; all of which had to be simultaneously developed, for none of them would have been of any benefit without the others, and several of them could have been of no possible benefit until considerably advanced in development. Here, as elsewhere, it was either intelligent correlation or as many as seven parallel lines of *correlated accidents*.

WASPS.

A wonderful piece of instinct is exhibited by a solitary wasp, the *Cerceris bupresticida*. "It attacks beetles belonging to the genus *Buprestis*. Now, if the *Cerceris* were to kill the beetle before placing it in the cell, it would decay, and the young larva, when hatched, would find only a mass of corruption. On the other hand, if the beetle were buried uninjured, in its strnggles to escape it would be almost certain to destroy the egg. The wasp has, however, the instinct of stinging its prey in the centre of the nervous system, thus depriving it of motion, but not of life ; consequently, when the young larva leaves the egg it finds ready a sufficient store of wholesome food." Sir John Lubbock (*Metamorphosis of Insects*, p. 11.) How could this wasp ever have casually learned that this was the best way to preserve food for its young ?—how did it learn to know the spot to insert its sting ?—and how did poison of the exact strength and quality to

bennimb and not kill come to be secreted? Here are two wonderful pieces of instinctive knowledge and one functional preparation, that each without the others would have been useless. If it should be imagined that they could have casually occurred once in the same individual, it is out of the question to suppose that they could have so occurred often enough to have established function and habit. Also it must be noticed that a little advance on the road to any of these co-ordinated accidents would have been of no utility; they must each occur in perfection to produce any beneficial result. So here we not only have preision but have it in three coördinated lines, each useless without the other, and each useless unless perfected.

But it is not *one* species of wasp *only* which has learned where to sting *one* insect so as to cause such numbness, but at least four species are known, each of which knows how to reach the ganglia of a different insect. Thus Mr. ROMANES says: "There is a species of wasp-like insect, called the sphex, which lays its eggs in a hole excavated in the ground. It then finds a spider which it stings in the main nerve-centre. This paralyzes the spider without killing it. The sphex now carries it to its nursery and buries it with the eggs. When the eggs hatch out the grubs feed on the paralyzed prey, which is still alive and quite fresh, though it has not been able to move. I was at first led to suppose that the sting of the sphex and the nerve-centre of the spider being both organs situated on the median line of the respective animals, the striking of the nerve-centre by the sting might in the first instance have been thus accidentally favored, and so have supplied a basis from which Natural Selection could work to the perfecting of an instinct always to sting in one particular spot. But *M. Fabre* has observed another species of sphex which preys upon the grasshopper, and as the nervous system of the grasshopper is more elongated than that of a spider, the sphex in this case has to sting its prey in three successive nerve-centres in order to produce paralysis.

More recently *M. Fabre* has found another species of sphex which preys upon a caterpillar, and in this case the animal has to sting its victim in nine successive nerve-centres." Mr. ROMANES admits that Mr. DARWIN and himself were unable to satisfactorily explain this on the principles of Natural Selection. That the wasp should accidentally have found the nine different nerve-centres of the caterpillar often enough in succession to have formed a transmissible habit reaches into the infinite of impossibilities and makes the explanation by prevision an absolute necessity.

CASTING EPIDERMAL GROWTHS.

Of strictly anticipatory processes may be mentioned the annual renewal of the horns of the deer. It can be readily perceived how the first pair may have been developed, either by use on Lamarckian principles, or by accidental variations according to the Darwinian theory; for being of utility both in defence and offence, they were precisely of that kind of variation to be saved by Environment. But it can not be conceived how the second and succeeding pairs could have been developed, since they could have been neither used nor useful while the first pair which fell off to give place to them was still carried. A similar case is that of the growth of permanent teeth to replace the milk-teeth in mammals. The development of the former is readily explainable on either theory, but the latter on neither. The same is true of the successive moultings of birds, snakes, and various other animals. The development of the first covering might be explained by Natural Selection, but not the later ones, because preparation was made for these before they were yet needed. They are products of anticipatory physiological action, possible only through prevision.

CHROMATIC CORRELATIONS.

Another remarkable correlated previsional arrangement is thus stated by Prof. FAIRCHILD: "The protection afforded by *chromatic function* consists in the power possessed by many fishes, crustaceans, amphibia, and reptiles, of adapting their general coloring, often by extremely rapid alteration, to the coloring of the surrounding objects. This is very striking in many fishes. It can be readily observed in the common tree-frogs. The chameleon and the devil-fishes are famous for their power of changing color when irritated." (*P. S. M.*, Sept. 1882, p. 595.) Here neither the physiological function nor the instinctive knowledge guiding to its use could have been beneficial without the other, and therefore they must have been comparatively developed.

MULTIPLICATION OF ORGANS.

Another anticipatory provision is found in the electric battery of the torpedo and other electric fishes. This is a very complicated and elaborate organ. To have built it particle by particle and molecule by molecule would have been an immensely tedious process as well as one of great ingenuity. It could not have been of any possible use in its incipient stages. These stages must have been strictly preparatory to future use, and therefore could not have been the result of Natural Selection. The DUKE OF ARGYLL says: "The Electric Ray, or Torpedo, has been provided with a battery closely resembling, but greatly exceeding in the beauty and compactness of its structure, the batteries whereby man has now learned to make the laws of electricity subservient to his will. There are no less than 940 hexagonal columns in this battery like those of a bee's comb, and each of these is subdivided by a series of horizontal plates, which appear to be analogous to the plates of the Voltaic Pile."

(*Reign of Law*, 61.) Mr. DARWIN says : " It is impossible to conceive by what steps these wondrous organs have been produced." (*Origin of Species*, p. 524.) And Prof. HUXLEY says : " We cannot assign any possible use for the pseudo-electrical organs." Not only do we here have 940 lines of correlated accidents, but lines of accident correlated to a mysterious, and in animal organisms an unfrequently manifested force. But more than this, there is here evident pre- vision, since the early beginnings of this organism and function could not have been beneficial to the animal.

A similar principle is illustrated by the evolution or creation of the eye. The DUKE OF ARGYLL says : " All the organs of sense discharge their functions in virtue of a purely mechanical adjustment between the structure of the organ and the particular form of external force which it is intended to receive and transmit. How fine those adjustments are can best be understood when we remember that the retina of the eye is a machine which measures and distinguishes between vibrations which are now known to differ from each other by only a few millionths of an inch." (*Unity of Nature*, p. 37.) And Prof. CLIFFORD says : " There are 1,200,000 rods or cones of the retina which receive the light." (*Seeing and Thinking*, p. 47.) It is these cones that are so adjusted to the waves of light as to give the infinitude of tints of visible color. Now the question is, How were these cones, almost countless in number, produced by Natural Selection or any other evolutionary process ? Of course, benefit cannot be denied, and at first thought it would seem to be the very kind of an organism most favored by Natural Selection. But a little reflection shows insuperable difficulties. If formed all together and gradually, how did so great a number come to be pitched upon ? How did it come about that by accident 1,200,000 happened to be started in growth at the same time, and that the same accidental continuance of growth happened to all of them at every forward advance ? Does not this

theory give us a necessity for 1,200,000 lines of accidental correlations? But suppose it be said they were produced independently, one at a time, is the difficulty lessened? How then are they brought into correlation at all? How did the last come to co-ordinate exactly with the first? And was the whole number utilized in the struggle for life? Would not 1,000,000, or 800,000, or 100,000 have given all the sense of vision absolutely needed in life's battle?

The like argument is presented by the multitudinous eye-facets of various insects; the butterfly and dragonfly having 17,000, and some beetles 25,000; and each facet, as W. MATTIEU WILLIAMS says, with its "own cornea, its lens, and a curious six-sided transparent prism, at the back of which is a special retina spreading out from a branch of the main optic nerve."

The same principle is illustrated in the spinning organs of the spider. "The body of every spider contains four little masses pierced with a multitude of holes, imperceptible to the naked eye, each hole permitting the passage of a single thread; all the threads, to the number of 1,000 to each mass, join together when they come out and make the single thread with which the spider spins its web, so that what we call a spider's thread consists of more than 4,000 threads united." (*Sci. Am.*).

The human ear with "Corti's organ, an instrument of 3,000 strings," is another illustration. Were these developed altogether or singly? And how can Natural Selection account for the process either way? Can it be imagined that the 3,000 "strings" simultaneously, by accident, first appeared in incipiency and have ever since accidentally kept even step by variations forward in the same direction? Or if it be said that they were developed singly and independently, can it be claimed that the last one or the last hundred developed were so absolutely necessary in the struggle for life that Environment sifted them out for preservation, leaving all men and women who had not been favored by the accident to perish for want of it?

Natural Selection must say one thing or the other or it fails, and I apprehend that no careful thinker will venture to say either.

INSECTS AND FLOWERS.

One of the most fascinating departments of the theory of Natural Selection, and one that has been worked out with great patience and ingenuity by Mr. DARWIN, Mr. WALLACE, and their followers, is that of the reciprocal evolution of the reproductive functions of plants, and the tastes, instincts, and appliances of insects for obtaining and utilizing the saccharine matter secreted by the nectaries of flowers. It supposes that these secretions, together with the showy attractiveness or odors of flowers, have been developed by the habit of visiting insects bearing the fertilizing pollen from one flower to another; while reciprocally, the organs of insects for gathering and appropriating the nectar, together with the tastes, instincts, and sensibilities which enable them to find the flowers, have been simultaneously and reciprocally developed to enable them to profit by the gift of the flowers.

On this subject Dr. W. J. BEHRENS says: "Of insects, the Coleoptera, the Lepidoptera, the Diptera, and the Hymenoptera are the orders most concerned in the fertilization of flowers. These are enabled to effect the end in question by various physical peculiarities which chiefly take the form of *special structures by means of which the insects are enabled to reach and abstract the honey contained in the flower, and also to transport the pollen.* Butterflies are excellent honey-hunters, because their proboscis is very highly developed. When not in use it is kept coiled up like a watch-spring, but can be uncoiled at will and thrust into the flower. It is hollow and the honey is sucked up by the extreme tip. . . . Over two hundred species of our native bees are known as frequenting flowers, the most familiar being the common honey-bee, which have certain parts of their body specialized

for collecting pollen. The structures developed for this end are in their way perfect. They may be found either on the ventral surface of the posterior portion of the body or on the legs. Accordingly, bees may thus be divided into two groups. . . . The process of cross-fertilization is, in many tropical species, always effected by birds, which visit the flowers on account of their nectar." (*Pop. Sci. M.*, Sept. 1885, p. 595.)

Now, it will be noticed that primarily this theory rests on the fact of the utility of *cross-fertilization*; a principle that must have been established along with sexuality itself, and which makes crossings more beneficial between strangers than between near relatives. And no way has been found by which Natural Selection can account for this principle.

But accepting the principle as a sexual law, the query is, Did the flowers for themselves, by utilizing insects, contrive and perfect a means of cross-fertilization?—while, at the same time, insects for themselves utilized this principle of sexuality in plants, and this effort at perfecting cross-fertilization by the latter, in contriving and perfecting the means of making beneficial use of this plant effort?

Let it be observed what each of these reciprocal contrivers has to do under the theory. First, the plant has to elaborate a chemical process of manufacturing honey, then an organ with the function of secreting the same in advantageous proximity to the organs of reproduction, and then manufacture signals to attract the attention of insects. On the other hand, the insect has to develop the functions of digesting and assimilating the nectar, organs for obtaining it when found, organs of locomotion for reaching it, organs for collecting and carrying the pollen, organs of sense for observing the signals, and instincts which will guide it in utilizing these several sets of organs.

Now, observe that by the theory of Natural Selection each one of these several improvements on both sides has to be worked out by the slow and *casual* selection

of *casual* variations, and no one of the conditions can go ahead of the others.

For instance, none of the other improvements could have been of any use whatever until the insect was prepared to assimilate the nectar of the flower. The same may be said as to the organs for obtaining the nectar. And emphatically may it be said of the senses and instincts which enable it to find and lead it to the flower. But each of these conditions can be attained only by beneficial use. Each supposes that the existence of all the other conditions renders its own use necessary. Development of functions for the assimilation of nectar presupposes proboscis for collecting it, taste to like it, wings to reach it, sensations to discover it, and instincts to glide to it, as well as the means of carrying away both honey and pollen.

The production of a proboscis to collect nectar, likewise supposes the existence of all other conditions. And so of the wings, and so of the senses and the instincts. And not only this, but they each presuppose the existence of the nectar and the color of the flower. If it should be argued that all these conditions were simply modifications of prior conditions to adjust the butterfly to the flower, the objection comes back that the modifications must have been in parallel lines, while the advances in either faculty presupposes an equal advance in all the others, so that the difficulty is not removed, but only subdivided.

On the other hand, the development of nectary and color presupposes the existence of all these faculties in the insect. On no other supposition does their evolution become intelligible.

There could have been no reason why an accidental secretion of honey should have become a hereditary fixity except that it proved beneficial to the plant in which it arose; but the only manner yet suggested by which it may have been beneficial was in attracting honey-seeking insects; and there could have been no honey-seeking insects without assimilative functions to use the honey, proboscis to gather it, wings to carry

them to it, and tastes, eyes, and instincts enabling them to find it.

So that while it is true that there is a very wonderful adjustment of the plant to the insect, and of the insect to the plant, as if each were made for the other, Natural Selection does not seem to furnish the key to the process of coadjustment.

Here, then, we have not only what must have been parallel lines of reciprocal development between the organs and functions of the same being, but also, and more wonderful still, like parallel lines between one species in the animal and another in the vegetable kingdom, each simultaneously fitting itself for the future use of the other and future service for it.

THE GALL-FLY.

Of one organism produced solely for the benefit of another, the DUKE OF ARGYLL instances and graphically describes the growths of excrescences on the leaves of the oak, rose, and certain other plants, as the habitats of larvae of various species of the gall-fly—structures which can be of no possible utility to the plants bearing them, but whose exquisite workmanship is perfectly adapted to the needs of their animated inhabitants. The DUKE OF ARGYLL says:

“There is one group of insects well known to every observer—the common gall-flies—which has the power of calling on the vegetable world to do for them the work of nest-building; and in response to the means with which these insects are provided, the oak, or the willow, or the rose, does actually lend its power of growth to provide a special *nidus* by which the plant protects the young insect as carefully as it protects its own seed. . . .

“If we examine one of these nests—for example, that of the marble gall (which is the nest of the species known to entomologists as the *Cynips Kollerii*)—we shall find that there has been formed on the branch or twig of the oak a globular body of the most curious

and complex structure. Externally it has a skin which imitates the natural bark. Internally it consists of a pithy tissue which is wholly unlike any of the tissues produced by the oak under its natural conditions. It is a radiating tissue, and yet it does not radiate from the point which is its apparent point of growth or of attachment to the stalk. It radiates from its own centre—or rather from a little cell or chamber which occupies that centre. The cell or chamber is internally quite smooth, has a thin wall of hardened material, and is of the exact size and capacity which will admit of the insect larva being coiled up comfortably within it, and of attaining there a certain definite degree of development or growth. Outside the thin wall of this cell or chamber, and between it and the external bark, the whole sphere is filled with a substance which may be described as a granular pith which radiates in all directions from the cell to the circumference. If one of these galls be cut or broken open in the autumn when it is becoming ripe, and if the cut be made so as to expose the whole in section, one of the most curious sights in nature is exposed to view. The grub is then seen folded in its pregnant nest. . . . The oak has yielded up its juices to protect a stranger; they overflow it without venturing to involve it,—circling round it and bending over it,—as if in awe before a life which is higher than their own. . . . Yet for the nature and protection of this poor maggot the most secret of these powers is held to labor. The forces of vegetable growth work for it as they never work for their own natural organs. They secrete for it a peculiar substance; they hang it out in light and air as if it were their own fruit; they even exhaust themselves in its service, and their own flowers and leaves are often cankered in its support.

"All this is an exception to ordinary laws: a break, as it might almost seem, in the unity and in the continuity of nature. And so in a sense it is. It is no natural function of the oak or of the rose to produce these galls. They are in one sense of the word mi-

natural, and in the truest sense of the word highly artificial. . . . This adaptation is revealed when we examine the structure of the mother gall-fly. It then becomes at once apparent that the gall is produced by the operation of an elaborate apparatus. This apparatus is so elaborate and so complicated that the most eminent entomologists have been exercised upon its mechanism since the days of Reaumur without being able fully to explain or understand it. The general principle, indeed, or idea, of the apparatus appears to be ascertained. It is an apparatus for inserting the egg of the fly into vegetable tissue, with such effects upon that tissue, both by mechanical injury and by chemical poisoning, that the plant is stimulated and excited to abnormal action and to artificial growth. For this extraordinary purpose, and with this most mysterious and complicated result, there is elaborated in the body of the fly implements for boring, for rasping, for brushing, for irritating by mechanical means the substance of the plant. The same implements are further made to subserve the function of inserting the egg, and along with it of inserting also some acrid animal secretion which has a specific action on the secretions of the plant." (*Unity of Nature*, p. 41.)

Mr. ROMANES has said: "Amidst all the millions of mechanisms and instincts in the animal kingdom there is no one instance of a mechanism or instinct occurring in one species for the exclusive benefit of another species. Every species is for itself and for itself alone—an outcome of the always and everywhere fiercely raging struggle for life."

But in this instance one species certainly does exhibit a function acting solely for the benefit of another species. The oak is certainly not benefited but injured; and therefore Natural Selection cannot reach it. But there is another view to be taken of this illustration. Along with the organs and functions of reproduction is the development of the apparatus with the several functions of piercing and wounding the

wood of the twig, of depositing the egg, depositing the acrid juice of the fly, the organs for secreting that juice, the function of secreting it, the instinct of selecting the proper part of the proper plant, and the further instinct of properly using its apparatus upon it. All these correlated adaptations must have been simultaneously developed on Mr. DARWIN's theory by simultaneous correlated casual variations, because some of them would have been of no benefit without the others.

And in correlation with all these must have been developed the capacity and function and instinct of the oak to fabricate the wonderful oak-gall in answer to the demand of the gall-fly. But the latter, as we have seen, lies entirely outside of the purview of Mr. DARWIN's theory, because it is of no possible benefit to the oak. It is wholly a benefaction bestowed by the oak upon the gall-fly. And therefore the oak-gall can not have been produced by Natural Selection nor any other non-previsional method. The oak must, in each case, the first as well as the last, have intelligently prepared the nest for the insect. So there must have been a process of double reciprocation in the development of contrivances, one set of reciprocations between the several reproductive organs, functions, and instincts of the fly, and a more general reciprocal development between the functions and habits of the fly and the functions and instincts of the oak.

FOOD-PLANTS.

There are vast numbers of adjustments in nature that, in the form in which they appear, are of great utility to other organisms, and yet, which might have been more beneficial to the possessors in some other form. The succulence and edible qualities of tender herbs and grasses may be mentioned as one instance. They become the food of ruminant animals and are thus liable to be eaten out and extirpated at a period when the plants themselves receive no benefit from

being pastured. After the maturity of the seed, it may be said they are benefited by being carried abroad and sown broadcast. Not so, however, in the early period before the seed, or even the plant itself, is mature. Now there cannot be any reason seen why all young plants might not have been evolved bitter in taste, or poisonous, or with spines, as a protection against the beasts which live upon them.

There is a struggle between herbage and herbivorous animals, and evolutionists teach us that some plants do arm themselves with thorns and bristly appendages as a defence; and some, they tell us, have learned to distil and secrete poison, or bitter and acrid juices, to save themselves from the animal plant-eaters. Why have not all plants protected themselves in the same way?

Or why, on the principles of Natural Selection, were the nutritive qualities developed in the first place? Why should the herbs and grasses have been originally evolved as wholesome, digestible, tasteful food-plants? It cannot be denied that it would have been just as well for the plants in every other way, if their whole substance had been indigestible, bitter, acrid, or poisonous, and vastly better in that it would have afforded perfect defence against the animal kingdom.

The animal kingdom could not have lived without the vegetable, but the latter could have lived very well, and so far as we know just as well, without the former. Then, does it not look as if the nutritive properties of the latter were intended not for its own benefit but for the benefit of the former? And is it not patent on Mr. DARWIN's own argument that these properties cannot be accounted for on the theory of Natural Selection?

We are told by GRANT ALLEN that the kernel of the hickory-nut is wrapped in an exceedingly hard shell to protect it from the squirrel; but why was that kernel made so edible, so nutritive, and so tempting, both to squirrel and man? Is it not clear that while the hard pericarp was being evolved for the benefit of

the tree, the edible quality of the kernel was developed for the benefit of the squirrel ?

BEASTS OF PREY.

Coming now to the animal kingdom, we are taught that the swiftness and keen instincts of the antelope are developed to protect it from the wolf ; but for what was the delicacy of its flesh developed if not for the benefit of the wolf ? Is it not clear that for all uses and benefits of the antelope alone, its flesh might have been utterly indigestible or poisonous to the wolf, instead of the tempting morsel it is ? The antelope does not need the wolf, but the wolf cannot exist without the antelope ; nor without it, constituted as it is, with edible and nutritive flesh. Other kinds of flesh would have served the antelope as well, but would not have served the wolf at all.

Therefore, as between these two races the matter seems to stand in this sort : Had there been no antelope or other herbivorous animals for the wolf to prey upon, or had their flesh been differently constituted, there could have been no wolves, for lack of food ; but if the antelope had been without fleetness of foot, and sharp senses, and instincts, the wolves would soon have devoured them all and then been without prey. So really, while the niceness and wholesomeness of the ruminant's flesh is beneficial to the beast of prey only, its swiftness and keenness of sight and hearing are not only beneficial to both races, but necessary to the existence of both.

Such is the balance between all beasts of prey and the animals upon which they live. The life of the fox or the hawk is dependent upon the edibleness of the flesh of the hare. For the hare's own use its flesh need not have been edible, but for the use of the fox and the hawk it was made so ; and as a balancing defence, the hare is allowed large eyes, long ears, swift legs, and timidity. Without these qualities, the hares would all soon be caught up and then the foxes and

hawks would perish. These qualities, while primarily for the benefit of the hares alone, are secondarily, and in the long run, of equal benefit to hawks and foxes. The *edibleness* of the hare's flesh benefits *only the latter*.

A quail would succeed just as well if neither its flesh nor its eggs were edible, but in that case the weasel and the skunk would perish. Yet if the quail or its nest was too easily taken, it would soon be exterminated and then the others would perish. So the quail has shyness and secretiveness for its protection. These benefit itself primarily, and the weasel and skunk secondarily.

So, it readily appears that the very existence of carnivorous animals depends, primarily, upon qualities in their prey which are of no special use to the prey; and secondarily, to qualities and conditions in the prey which are of first importance to them in preventing their speedy extermination.

And so with man. His very existence depends upon the *edible* and *nutritive* qualities of herb and fruit and seed in the vegetable kingdom, and of flesh and milk and eggs in the animal kingdom, none of which, except milk, are of special use to the species which produce them. Plants would flourish just as well if all their products were indigestible or acrid to the stomach of man. Animals would be in no way inconvenienced if all their flesh and eggs were poisonous to him.

We have, therefore, special adaptations in the vegetable kingdom not specially necessary there, making possible the plant-eaters in the animal kingdom; and special adaptations in the plant-eaters, not specially necessary to them, making possible the animals of prey. And as these special adaptations are not of special benefit to the races where found, they cannot have been developed by Natural Selection as taught by Mr. DARWIN.

SPECIAL NON-BENEFICIAL PRODUCTS.

And in this connection there is one very curious class of cases, to wit: the secretion of peculiar products by plants which can be of no use to them, but is of great use to man. It is only necessary here to refer to plants producing sugar. Certainly the saccharine quality of the sap of the sugar-maple can be of no special use to that tree. Certainly in the sorghum and sugar-cane it is disadvantageous, for it causes them to be sought after and destroyed by herbivorous animals. Yet next to bread, sugar is to civilized man the most important article of vegetable diet. Also of what utility is tannin to the sumach or oak, or its juice to the rubber tree, or turpentine to the pine tree? What peculiar benefit does the cork tree derive from its bark, or flax and hemp from their lint? In what way is the sheep benefited by growing wool instead of hair or fur? How does its dye help the cochineal insect, or the indigo, or madder plant?

THE BEAUTIFUL.

Nature is full of creations of beauty and elegance that could never have been of benefit to the individual or race. One needs but to examine any museum of shells and coralline formations from the deep seas to be convinced of this.

Why are the inside of many shells and the outside of others living in the dark depths of the sea so wonderfully painted and sculptured? Why is beauty of form and color scattered all through lower life where it is impossible that "Sexual Selection" could have exerted any influence? What benefit are all these and similar properties to individual or race?

JOHN BABCOCK says: "The home of the *Arcella* is egg-shaped, and delicately marked with a minute and regular pattern. We thus approach one of the most wonderful operations of nature, and one which is still

involved in much obscurity—namely, the formation of shells, or rather the marvellous forms, markings, patterns, and appropriate colors which are produced under this name. Curiously enough within certain limits, the more simple the organism the more beautiful is its shell or shield." (*Vignettes of Invisible Nature*, p. 62.)

Again: "Not much has been said as to the beauty of this creature; in words it is difficult to describe it. Imagine a lovely, flower-like animal within a fine crystalline goblet; it is folded up for the moment, but its life is too short for long repose, and soon it proceeds to resume its normal state. The petals open, expand, and the finely-spun, glass-like setæ, finer than the finest hair you ever saw, are thrown forth in flowing, flossy masses, glistening in the light with opaline tints, and spreading out in all directions beyond our utmost gaze, all in wavy lines around the body of the possessor. Such is the beautiful Floscule." (*Ibid.* p. 42.)

Now how can Natural Selection account for such phenomena? Is it not clear that some other principle must be appealed to? Natural Selection is founded upon supposed benefits accruing to the developing species—but who can point out any benefits arising from the occurrence of beauty in these situations?

Says Prof. LE CONTE: "Beauty which is without any use cannot be explained by Natural Selection. Now, as already said, the most gorgeous beauty is lavishly distributed even among the lowest animals, such as marine shells and polyps, where no such explanation is possible. The process by which such beauty is originated and intensified is wholly unknown to us." (*Ev. and Rel. Thought*, p. 252.)

HARMFUL ACQUIREMENTS.

Of the leech, Dr. BERGHAUS tells us: "It readily drinks the blood of cold-blooded and warm-blooded animals, and fills itself so greedily with the latter that it cannot endure the surfeit, and dies soon after." Of

course Natural Selection cannot account for this self-destructive instinct.

The *niata* breed of wild cattle in South America is a notable instance of a harmful acquirement. Mr. DARWIN relates that because of the monstrous shape of the jaws of this animal they are so greatly inconvenienced in feeding, that in times of short pasturage they frequently die from starvation ; so that, as a matter of fact, Environment tends to the killing off instead of the preservation of the race. Here has been a development harmful and destructive to the species, an evolution right in the teeth of Environment within a very recent historic period.

Of organic acquirements and instincts which can not be helpful, but in many instances must be hurtful to the possessor, is the faculty of instilling poison into the wounds from which many blood-sucking vermin, such as ticks, fleas, and mosquitoes, draw nourishment from vertebrate animals. These pests are none the better off from leaving their noxious secretions as compensation for the blood they carry away. Indeed, it is positively harmful to these annoying insects, since it causes the sufferers to make much more vigorous efforts to fight them off or escape from them than they otherwise would do. And in this regard this faculty is beneficial to the victims, since it arouses them to self-defence. Now, it is not seen that Natural Selection can offer any explanation of this phenomenon for the very reason of the lack of beneficial quality to the possessors.

Prof. F. H. HERRICK says of the Bahama sand-fly : "The pest of the place"—Green Turtle Key, Bahamas—"was a microscopic midge, called the 'sand-fly,' with black head and transparent body, whose burning touch was like that of a sharp needle on the skin." And who has not read of the buffalo-gnat of the Mississippi swamps, which frequently proves destructive to exposed live stock ?—or of the still more poisonous and deadly African *tzetze* ?

Other self-destructive instincts are the crowding of

moths and other night-flying insects into the evening candle or torch ; the devouring of their own young by some male fish, rabbits, cats, and other animals ; and of the male spider by the female. Another striking example of a harmful propensity, utterly unexplainable on any principle of Natural Selection, is exhibited by the lemming, a little Norway rodent which breeds in the mountainous regions of the Scandinavian Peninsula, and occasionally makes great emigrations to the sea, where it takes to the water by thousands, with the certainty of drowning. In their journeys they go straight forward, permitting neither man nor beast nor mountain nor stream to turn them out of their course. It is supposed that over-population is the occasion of these mysterious emigrations to destruction. Says a writer in *Temple Bar* : "When the time for the settlement of the question of partial extermination for the benefit of the race, or total extermination by starvation, can no longer be delayed, they assemble in countless thousands in some of the mountain valleys leading into the plains, and the vast army of martyrs being selected, they pour across the country in a straight line, a living stream often exceeding a mile in length and many yards in breadth, devouring every green thing in their line of march. They march principally by night and in the morning ; and nothing animate or inanimate, if it can be surmounted, retards the straight onward tide of their advance. If a corn or hay-rick be in their way, they eat their way through it ; and on arriving at the smooth face of a rock, they pass round it, forming up in close column again on the other side. Lakes, however broad, are boldly entered, and rivers, however deep and rapid, are forded. Foxes, lynxes, weasels, kites, owls, etc., hover on their line of march and destroy them in hundreds, but the survivors, impelled by some irresistible instinct, press onward, until they lose themselves in the sea in such numbers that for miles their bodies, thrown up by the tide, lie putrefying on the shore. Very few ever return ; but

there can be no doubt that some do." Prof. W. DUPPA CROTCH attempts an explanation of the origin of this strange instinct by supposing that formerly the continent of Europe stretched far westerly from Norway, affording a milder climate, to which the lemming was in the habit of migrating, until the instinct became established; and further, that since that part of the continent has been under water, the instinct has been transmitted by a long line of ancestry which never migrates—something as the instincts of the neuter bee are supposed to be transmitted by a parentage which never possesses them. But he neutralizes this theory by stating that the lemmings on the east of the mountain-backbone of Norway go to the Gulf of Bothnia for their baths. Anyway, here is a great destructive instinct unaccounted for, except on a wild and uncertain hypothesis, and of very uncertain value even if the verity of its terms could be established. And if it could be shown that there had been such migrations to a now sunken land, it would still leave unexplained the instinct originally leading to such migrations. If such migrations were made to a distant and milder climate many hundred miles away, it is scarcely within supposable bounds that any of the little animals ever returned to Norwegian mountains; and if they did not return regularly and for a long time, how could the migratory instinct ever have been thus established?

LEAPS OVER ENVIRONMENT.

Of leaps over Environment, many might be mentioned. The appetites of the tick family, mosquitoes, and other insects for mammalian blood is one. Probably not one tick in a million ever has the opportunity of drawing blood. In some sections of country for short seasons of the year they are inconceivably numerous in the woods and grass, from a size scarcely visible to the naked eye up to one eighth

of an inch, and even more, across. That they can and do live without blood follows from the evident fact that such a very small proportion of them ever have the opportunity of obtaining that aliment. But all species have the instinct and the organs "to go for blood" whenever they can reach a mammalian. Not only so, but their instincts lead them to the tenderest spots on the animal, as well as to those parts where they are least easily reached and expelled.

This class of facts is sharply illustrated by the natural history of the "green-heads" (*Tabanus ruficornis*), a species of "horse-fly" which propagated in the rank grass of the western prairies before these were appropriated by man. So numerous were they that in bright weather, in the heat of the day, say from 8 A.M. to 5 P.M., from about the 10th of June, for forty to sixty days, no unprotected ruminant could remain from under shelter. My earliest recollection carries me back to a time when the large prairies of northern Missouri were entirely unoccupied. The only settlements were clearings in the timber-lands which skirted the streams, with only an occasional extension into some "arm of prairie." The herds of stock then kept were small, not much more than what supplied the needs of the "small farmers," and that term covered the whole class of pioneers who had then pushed out so far. The only wild ruminants then in the country were the deer, and they always retired to the deep woods in the heat of the day in "fly-time." The elk and buffalo had retired twenty-five to forty years earlier. The green-heads would not follow the range-horses and cattle very far into the timber, so that as the sun grew hot the latter invariably found retreat in the woods. As to the habits of the elk and bison in this regard, I am not informed. Probably the hide of the latter, at least, was too thick for penetration by the green-heads—but I do not know how that was. However, it is certain that for twenty-five to forty years, on these great prairies, the opportunities afforded to these

pests to taste blood could scarcely have been one in a million. Indeed, away from the skirts of timber, out in the middle of these prairies, which were frequently from ten to twenty miles across, the opportunity could scarcely ever have been presented ; and yet, not only did they live and flourish and multiply, but retained, if they did not evolve, their blood-sucking organs, instincts, and appetites with a distinctness, keenness, and relish that made them the terror of the frontier farmer and a great natural impediment to the bringing of these great prairies into a state of tillage. And it is a remarkable circumstance that just as the legitimate prey of the "green-heads"—herds of domestic stock—increased on the prairies, they gave back, until now they are almost unknown where fifty, and even thirty years ago they held undisputed sway for near two months in the year. With and just in proportion to the increase of the supply of beverage which they seemed specially adjusted, both by mechanical appliances and instincts and appetites to live upon, they have died out. Now, it is not seen how Natural Selection can account for any of these facts. Indeed, they seem to be mal-adjustments solely, entirely misfits to Environment.

RESTORING LOST ORGANS.

The capacity for restoration of lost parts possessed by many animals, and the healing of wounds both by plants and animals, is a faculty that assuredly could never have been developed by Natural Selection ; for wounds or mutilations of the same particular character and in the same particular place must have been entirely too infrequent to have become a fixed habit in any species, much less in the innumerable species of both kingdoms which possess the power. Even EMIL DU BOIS REYMOND says, " This power could not have been acquired through Natural Selection." And in none of the life functions are the vital powers more

evidently guided by intelligence. A wound or mutilation having occurred to a living being, Natural Selection must suppose that all the vital power was turned by accident to assimilating, carrying, and placing digested matter in proper place for repairing the hurt, and further that such accidents continued to occur until the healing of wounds became a habit of the body. But the very first instance, as well as the last, was possible only through knowing how to do, since it was of necessity a highly intelligent act which could never have been accomplished by accident. As Dr. NATHAN ALLEN says: "All the sound parts of the body seem to conspire together to help the part or organ affected."

CURIOS INSTINCTS.

The origin of many instinctive habits of animals not readily classified is equally inexplicable by Natural Selection. Thus Mr. ROMANES admits that both he and Mr. DARWIN were unable to explain satisfactorily how partridges, ducks, and plovers, by Natural Selection, acquired the instinct of trailing their wings, as if broken, to decoy dogs or other animals away from their broods. So it is not seen how the theory can explain the origin of the curious habit of several fishes of hatching their eggs in the mouths, or sometimes in the gills of the males, as is the manner of the *Chromis paterfamilias*.

One of the most remarkable of known animal instincts has certainly been developed within less than a century. I refer to the appetite of the Kea, a New Zealand parrot, for the kidney-fat of sheep. Mr. G. M. GRANT, in *Harper's Monthly* (Aug. 1891), says: "The kea or mountain-parrot, a greenish-brown bird, formerly as harmless as others of its class, has developed a carnivorous habit as fastidious as that of epicures. It used to feed on the berries that grew luxuriantly on the hills, but it has changed that simple diet since the multiplication of sheep: perhaps fires,

too, made their natural food scarce. It now takes a terrible revenge on its unconscious enemy. Fastening itself on the back of a poor sheep perhaps stuck in a snow-drift, and savagely tearing away the wool, skin, and flesh, it plunges its powerful beak into the kidney-fat, which it devours, and then, leaving one victim to idle in agony, goes off in search of another." Now, it is not so strange that, its natural food having become scarce, this bird should have taken to animal food; but it is impossible that the pressure of want should have driven it to slaying live animals, and from them taking only one particular delicate morsel. A habit contracted in a "struggle for existence" would not be so select and wasteful. But until a scarcity of food compelled an exacting "struggle for existence," Environment could not have acted in sifting out feeders on all other parts of the sheep and saving only the fat-eaters, and there could have been no Natural Selection without just such sifting by Environment.

MODIFICATION FOR DIFFERENT HABITATS.

Of living beings whose production must have been on principles clear outside of or above contact with Environment, such examples as the bot-fly and tape-worm may be mentioned. In the former "the maggots are produced from eggs laid by the horse bot-fly (*Gasterophilus equi*). The female deposits her eggs upon those places which are most easily reached by the animal's tongue, as, for instance, the shoulders, the legs, the inside of the knees, etc. The effect of the moisture and heat of the tongue seems to be such that licking the places where the eggs have been deposited liberates the minute maggots contained in the eggs, which adhere sufficiently to the tongue to be carried from thence with the food into the stomach. On reaching the stomach they immediately attach themselves to the lining by means of two small hooks with which their mouths are furnished. Here they remain until the following spring, feeding upon the mucus

secreted by the mucous membrane. When full-grown they are about an inch in length. When the maggots are fully developed from the larvæ, they are removed from the stomach during ordinary evacuations." (*Scienc. American*, vol. 57, No. 2, p. 20.)

Every step in this circle means wisdom and plan; not wisdom that comes from experience or can be reasoned out, but a wisdom deeper than that and which is transmitted by endless Heredity. In this instance the problem Evolution has to deal with is this: The instinct of the bot-fly to firmly attach her eggs to the ends of the hairs on the appropriate parts of the horse, with proper appliances for doing so, and the adjustment of the egg and young maggots to their peculiar environments before, during, and after the sojourn in the horse's stomach.

An analysis will show the utter impossibility of this instinct and adaptability ever having been perfected by Natural Selection. Suppose the egg of a fly should have been swallowed by a horse and hatched in his stomach. Certainly it could not have lived and developed there unless it had already been adapted to the Environment. But how could it have been so adapted? According to the theory, only by oft-repeated or long-continued habitation there. That is to say, it could not have lived in the maw of the horse until anatomically, physiologically, and functionally fitted to live there, and could have been fitted to live there, *only by living there.*

But passing the first impossibility, and supposing it did live and escape to metamorphose into another fly, how would it know that if it should stick its egg to a hair on a particular part of a horse's body, it would cause an itching—which it undoubtedly does—and that the horse would bite and lick the spot, thus loosening the hair or egg, and carrying it into his stomach?

The theory is that instinct comes from actions intelligently repeated until they become mechanically habitual and are carried on as reflex actions. After the instinct is implanted there is no trouble about the bot-

fly following it. But how did the instinct arise? Where did it get the intelligence to do it the first, or the second, or the third time? It cannot be said that the instinct was a progressive development of intelligence, for a *part* of the intelligence would not have benefited. It had the first time and every time to know the animal—a horse; to know the part where the tongue could reach; to know to stick the egg to a hair; know the result without any further care for it. This is the *second impossibility*. The *third impossibility* lies in the fact that the instinct would have been of no benefit till, first, the means had been developed to attach the egg to the hair, and, second, till the grub had been so developed as to fit its new environment; while, on the contrary, neither the means to fasten the egg to the hair, nor the fitting of the larva to its home in the horse's stomach, would have been of any benefit without the fully developed instinct; so that each of these conditions would have been entirely useless without the full development of the others. Thus in this instance Natural Selection has to climb over at least three impossibilities.

Sir JOHN LUBBOCK gives this remarkable instance of animal instinct, illustrating the same principle: "The genus *Sitaris*, a small beetle, is parasitic on a kind of bee (*Anthophora*), which excavates subterranean galleries, each leading to a cell. The eggs of the *Sitaris* are deposited at the entrance of the galleries, and hatched out in September or October. They remain lethargic until April. The males of *Anthophora* emerge from the pupæ sooner than the females, and as they come out of their galleries, the little *Sitaris* larvæ fasten upon them. Watching their opportunity, they pass from the male to the female. At the moment when the egg is laid the *Sitaris* larva springs upon it: the egg of the *Anthophora* serves not only for a raft over the honey in which it is laid, but as a repast to the young *Sitaris*. The honey which is enough for either, is too little for both; and the *Sitaris*, therefore, at its first meal, relieves itself from its only rival.

After eight days the egg is consumed, and on the empty shell the Sitaris undergoes its first transformation. The honey which was fatal before is now necessary; the activity which was before necessary is now useless; consequently, with the change of skin, the active, slim larva changes into a white, fleshy grub, so organized as to float on the surface of the honey with the mouth beneath, and the spiracles above the surface. In this state it remains until the honey is consumed. It afterwards undergoes several other transformations and emerges a perfect Sitaris in August." (*Metamorphoses of Insects*, p. 30.) There is no possible way in which Natural Selection can account for the strange instincts of this insect. There are too many steps which alone would have been useless. If by accident it had attached itself to the male bee, that would have been useless without the further accident of passing to the female, and that useless without the further accident of passing to the egg, and that useless without the accidental instinct of eating the egg, and that useless without the accidental transformation which permitted it to float on the honey. None of the steps could have been developed alone, because alone there was no utility in any one of them. It is utterly inadmissible to suppose such a series of *pure accidents* all tending towards a single beneficial purpose in even one instance; but that it should have occurred often enough to have been stamped as a habit or instinct running clear through the circle of the insect's life is a proposition that outrages reason. It is an utter impossibility.

The habits of the liver-fluke of the sheep are thus described by Prof. HALSTED: "The adult fluke in the liver of the sheep produces an enormous number of eggs, which are distributed with the droppings of the sheep. If these eggs have moisture and a suitable degree of warmth, they continue to live and in each is formed an *embryo*. The embryo leaves the egg and swims in search of the particular snail (*Limnaeus truncatulus*), within which its future life and growth

take place. The embryo bores into the snail, and then goes into the form which is called a *sporocyst*. The sporocyst gives rise to the second generation known as the *redia*, which in turn produces the third generation, having the form of a tadpole and called *cercaria*. The cercariae quit the snail and enclose themselves in envelopes or cysts, which are attached to the grass, and when the grass is eaten by sheep or rabbits the young fluke comes out of the cyst, takes up its abode in the liver of its host, and the fatal circle is thus completed. The number of eggs produced by a single fluke may be safely estimated at half a million. The embryo has very simple eye-spots, which render it sensitive to light, and aid it in finding its future home. When the swimming embryo comes in contact with a snail, it at once bores into it through the shell by means of a peg-like projection at the broader end, which is extended, and the embryo spins around rapidly by means of its cilia." (P. S. M., Oct. 1883, p. 741.)

Now, it is very evident that by no possible succession of accidents could the fluke ever have learned to hunt for and bore into the snail, or to take its station on the grass and wait to be eaten by the sheep, or to find its final habitat in the liver of that animal. For supposing a first one in some way finding its natural home in the liver and its eggs being cast out, it is an entirely unsupposable case that any one of the progeny could ever return by the circuit described, unless provided with instincts and appliances specially fitted by prevision for each particular Environment.

Innumerable other instances might be given of beings passing different periods of their lives in different habitats without any possible explanation of the phenomena being obtainable from Natural Selection.

SEXUAL SELECTION.

Mr. DARWIN and his disciples give great weight to what is termed Sexual Selection in the development of the higher animals. They claim that the brilliant

colors and remarkable appendages seen in the plumage of birds, together with such organic structures as the comb of the cock and the antlers of the stag, are due mostly, if not altogether, to an æsthetic taste in the females which causes them to choose for mates the males which exhibit variations in these directions. It is therefore but a sub-mode of Natural Selection.

Now, before the theory of Sexual Selection can be accepted as fully adequate to the explanation of the phenomena in whose behalf it is invoked, it would seem that we should know something more of the origin, development, and character of the æsthetic tastes on which it depends. How did they arise?—and particularly how did they become so rigidly fixed in such straight and precise lines peculiar to each individual? How did it come that all the females of a whole variety or species would fall into the habit of admiring a tint for a particular feather, part of a feather, or group of feathers? for a certain particularly painted spot on the head, or the shoulder, or the throat, or the breast, or the wing, or the back, or the tail?—or the same precise length of certain tail-feathers, or the particular shape and curl of a peculiar head or neck or tail appendage?

On the principles of Selection, it would seem that there must have been such a taste in *all* the females of a race or variety during the time any such peculiarity was being developed; because the theory is, that the development came about through the rivalry of the males for the attention of the females; and the males who could best meet the female ideal of beauty was necessarily successful. It must have been something as a young woman who has a fancy for a particular color of gentlemen's necktie. The young man who happens to select such tie will be more likely to please and win her than rivals who have not been so fortunate in the selection of this article of dress. But then these rivals will turn to young ladies whose taste in dress may be different; so that it is not seen how this one young lady's fancy would tend to fix a style of male

attire. To reach this it would have to be that all young women, or at least a very large percentage of them, should happen to have the same peculiar tastes in this matter, so that the young man who should not happen to select the right colors or style would find it difficult to find a life-partner. But then how could it ever come about that young women, generally, should take a fancy to the same tint of necktie? By what process of Evolution could this condition of affairs be reached?

And the inquiry arises whether Sexual Selection has any surer basis in the philosophy of development than has Natural Selection. Now, it may be noticed in the first instance that if both Natural Selection and Sexual Selection are true principles in nature, they must necessarily be antagonistic to each other. A variation which would add strength for the struggles of life in other directions might very well add grotesqueness, if not deformity instead of beauty to the individual; while the æsthetic acquisitions might very well add weakness in the struggle, as indeed brilliancy of color must do, as both Mr. DARWIN and Mr. WALLACE admit. For they agree that it is the liability of bringing upon them the destructive attention of birds of prey while nesting which prevents most female birds from donning the attractive male colors. This is a clear recognition of a war between the two supposed modes of selection wherein Sexual Selection conquers with the male birds and Natural Selection with the females. The males acquire gay plumage notwithstanding the obvious dangers to which it subjects them. The females wear their inconspicuous plumage because of the little greater danger to which bright feathers would subject them while brooding. In the one case Sexual Selection overcomes and sets aside Natural Selection; in the other case it is unable to prevail in the struggle.

But there seems another insuperable objection to the theory of Sexual Selection. Unless the number of males were greatly in excess during such supposed process, or unless they were generally polygamous,

—in neither of which presumptions have we a right to indulge,—it is not seen how any severe struggles for particular females could have arisen. Recurring to our illustration of the young gentleman with the fancy necktie, it is not seen why the discarded gentlemen should not turn to the other females, particularly where they are all about equally plain, as is the case with the generality of female birds. In other words, it is not seen why all the gentlemen should be fancy-struck by a particular woman, nor why, although the women might all have *penchants* for the same shade of tie, all the disappointed ones should go into celibacy or leave offspring less vigorous and well fitted for the struggles of life. Granting the utterly improbable theory of all female birds fancying the same particular markings of a feather, can it be within reason that such as may have been disappointed in the rivalry for pairing with the wearer of the same would not have mated with other and plainer males, and which by the theory were otherwise equally as eligible matrimonial acquisitions, and that in this way the casual variation of the favored bird would in a few generations be lost by crossings?

For these several reasons the beautiful and highly ingenious theory of Sexual Selection seems to me utterly untenable, and with even less logical basis than Natural Selection.

Prof. BROOKS urges a very strong argument against the reality of Sexual Selection. He says: "Among the two hundred or more species of wild pigeons, where sexual action has every chance to act, there is no great difference between the sexes; but in the more valuable domestic breeds, where all choice is precluded and sexual selection out of the question, the males are as a rule more modified than the females." (*Laws of Heredity*, p. 221.) He adds: "If any hereditary variation should appear which contributed in any way to better adapting the female to protect the young, it would be at least as valuable to the species as an extra ornament or a new color in

the male; and there are certainly as many possible ways to improve a female animal as there are to improve a male." (*Ibid.* 233.)

CORRELATED ACCIDENTAL VARIATIONS.

Another line of argument may be here presented. The notion of Evolution necessarily includes two processes—ordinary reproduction and the advance of successive generations in some one or more lines of development. Every living being consists of two elements—one material, the body, and the other a principle, variously called Life, vitality, vital force, spirit, *anima*, always possessed of some degree of sentiency and capacity for commanding natural forces. We have, then, the material body, the Life-principle, and the being itself, composed of the two elements indissolubly conjoined so long as life lasts. In reproduction we have a duplication of the being in both its elements, a new body formed from existing material elements taken from the Environment, and a new Life-principle—formed from what and taken from whence? From nothing and nowhere? No evolutionist will say that. Then, as the only alternative, formed from something existent and taken from somewhere that something exists.

Now, Evolution means the advance of both these elements in form or mode, carrying with them the advance of the being itself in organic form, sentiency, instinct, and habits; advance of the body by taking material from the Environment and molding it into organs of different pattern and capacity, and advance of the Life-principle by taking what—shall I say vital stuff?—from whence?—and moulding it into a sentiency with a new turn or capacity. For it is evident that improved or new organs would be of no avail without an improved sentient capacity for using them, nor an advanced Life-principle without improved organic instruments fitted for higher use. And this would be equally true in the very first

advances of living beings as in the last. The conclusion necessarily follows that in all Evolution from the first there are two correlated lines of development conjoined in producing all advanced forms of living beings; therefore, that from the very first, Evolution is an intelligent and purposive process; and, therefore, that Natural Selection is excluded all along the line.

It may be noticed here that Prof. LE CONTE holds that "the spirit of man *was* developed out of the *anima* or conscious principle of animals, and that this, again, was developed out of the lower forms of Life-force, and this, in turn, out of the chemical and physical forces of nature." And although this is perhaps the usual evolutionary belief, it is entirely illogical, and for several reasons: (1) It places evolutionary processes before Intelligence; whereas we have just seen that the very earliest steps in development depend upon intelligent correlation for their solution. (2) It derives the Life-principle or sentiency from ordinary forces; whereas we have found that they are of different orders of existence. (3) Admitting that the "spirit" of the first man may have been developed by or from the *anima* of some animal, it fails to account for the origin of the spirits of men at all later periods. Whence came they? From the *anima* of animals? Was the soul of Prof. LE CONTE thus derived? That is absurd. (4) It would seem to predicate a process of mind-evolution uncorrelated with the development of the body. However, it may be that Prof. LE CONTE does not desire to have his language so interpreted. But if not his proposition should be, that the entire being, man, was developed from the entire being of some lower animal. The verity of this form of proposition will be considered in another chapter.

But my argument may be here continued in the same direction. Instancing one of the higher animals, it has innumerable organs in addition to such general systems as the osseous, the muscular, the nervous, the circulatory, the nutritive, etc., as well as

various instincts, appetites, and sensations. Now, modifications in any one of these requires co-ordinated adjustments in numerous others of them. This has been fully set forth by Mr. DARWIN and other evolutionists; and they seem to imagine that any modified organ, instinct, or habit has the power of dragging after it modifications of other parts or principles, so as to compel adjustments reciprocal to the modification of the former. But how this may be done, aside from intelligent direction, has not been shown.

I think it is one of those matters of correlation that cannot be explained otherwise than on principles of intelligent purposiveness.

But there are still deeper underlying principles to be considered. According to Natural Selection, every organ and function is subject to fortuitous variation in innumerable directions, so that while some one organ is changing in the direction of adjustment to Environment, it may very well be that variations are simultaneously occurring in all the others which need to be correlated with it, in directions directly the reverse of such co-adjustment. The principle may be faintly represented by dice—as many as there are organs and functions which need to be adjusted in harmony with the developing organ, where *one* may represent the co-ordinated direction of variation in the line of adjustment to Environment, while all the other numbers represent adverse directions. Now, in order to a harmonious advance of all the dependent organs and functions, it is necessary that all the dice thrown should show *ones*; but this is literally an impossible expectation unless the dice shall have been *intelligently loaded*. That is to say, the theory demands that fortuitous variations be reciprocally made in each and all of the organs and functions which need to be modified in adjustment to any particular line of development. But fortuity and reciprocity are contradictory terms; where fortuity prevails there can be no reciprocal action, and where reciprocity is found there can be no fortuity, but intelligent purposiveness instead. Therefore,

it is utterly impossible to bring Natural Selection into harmony with Fortuity, upon which, by the theory, it is compelled to stand if it stands at all. We thus again hunt the doctrine down to logical contradiction and absurdity, as we have already done on so many other lines of analysis.

WARD'S THEORY OF VARIATION.

Mr. LESTER F. WARD, of Washington City, has propounded a theory which he deems a satisfactory solution of the contradictions insisted upon in this line of argument, as well as many other difficulties lying across the path of Natural Selection.

Mr. WARD feels, like MIVART, COPE, and so many other eminent evolutionists, that Natural Selection, as propounded by Mr. DARWIN, is inadequate to the duty imposed upon it for want of a satisfactory "origin of the fittest," and in a published lecture on the "*Course of Biologic Evolution*," he has offered the following theory:

"The tendency to vary is in all directions as from the centre towards the circumference of a sphere, and variation will take place in every direction which does not become so disadvantageous as to render life impossible. In by far the greater number of cases the advantage or disadvantage is slight or imperceptible, and changes go on without improvement or deterioration, causing a great number of equally vigorous forms to arise, all differing more or less from one another. This accounts chiefly for the varied and manifold in nature; and but for this law—hitherto, so far as I am aware, unobserved—nature would be monotonous and uninteresting." (p. 21.) ". . . Those who question the principle of Natural Selection insist with apparent justice that the incipient changes due to accidental variation during a single generation are utterly inadequate to perpetuate and multiply themselves; that this utility must be infinitesimal and practically *nil*; and they pertinently ask how the machinery of Natural Selection was ever

set in motion. Strange as it may seem, the defenders of Natural Selection have thus far found no better answer to this argument than to deny its force and to maintain that every variation, however slight, if in the direction of utility, begins to operate from its inception and goes on increasing with cumulative strength. The answer is not satisfactory and its inadequacy has been sufficiently proved.

"But it seems to me there is an answer to the objection, and one which fully meets it. This answer is nothing more or less than the patent fact already stated that fortuitous variation actually does go on at all times, in many directions and to great lengths, without any perceptible change in the degree of adaptation which the varying forms have to their Environment.

"Here then we have the solution of by far the worst difficulty in the way of Natural Selection. The beneficial effect need not be assumed to begin at the initial stage. It need not be felt until well-formed varieties have been developed without regard to any advantage in the particular differences which they present. There seems to be no flaw in this mode of solving the paramount problem, and if it is objected that it amounts to a new explanation of the origin of species, I am ready to admit it, and I believe that more species are produced by fortuitous variation than by Natural Selection. Natural Selection is not primarily the cause of the origin of *species*; its mission is far higher. It is the cause of the origin of *types of structure*, such as those whose history I have endeavored to trace, and through which alone biologie Evolntion takes place."

Now, if "well-formed varieties" may be formed before "Natnral Selection" sets in, why may not "well-formed" species be as readily formed? On principle, why should it be any less difficult to grow "well-formed varieties" in the first instance, than to grow these into "well-formed" species afterwards? If fortuity is sufficient for the one, why not for the other? Mr. WARD invokes a principle, unconsciously it seems, which demands verification, as much as the "isolation"

of Mr. ROMANES. To the formation of his incipient varieties, a series of successive variations in the same direction, unbroken by variations in other directions, is necessary. For if the line of changes in the direction of a particular variety be broken by changes in other directions, of course the one set will be balanced and swamped out by the others. It is the old difficulty clad in new language. How can it be obviated? How can the unbroken line which Mr. WARD's theory demands be secured? Evidently either by necessary law or prevision. The former goes back to absolute and eternal necessity, the latter to purposive prevision, and prevision means a Divine interference and personal government. The theory does not get rid of the need of isolation in the formation of varieties, but only during the further development of varieties into species.

BATHMISM.

Prof. COPE, seeing clearly that Natural Selection inevitably breaks down in the effort to reach intelligent ends through unintelligent methods, has attempted to supply a theory, which on a superficial view might be considered as a system of personal Evolution; but a logical analysis shows that, like all the rest, it drops back into Necessarianism.

Prof. COPE's great work, "*Origin of the Fittest*," is a collection of lectures delivered on various occasions, and is, therefore, not systematic, contains much repetition, and the style is none of the clearest. But his system, as I understand it, may be epitomized in the following terms:

Consciousness, in the sense of general intelligence and of energy or force, is an attribute of matter; of some matter, but not of all matter; of matter in a generalized condition, that is, in a free condition as regards the binding force of molecular and gravitating energy. Such a state of matter he finds in protoplasm and supposes may exist in an ether filling interstellar space.

Consciousness and Energy, though both *attributes of matter*, act upon matter, and control and determine its movements; they are before life, which is but an expression of a peculiar mode of control which they exercise over matter. They do not correlate or metamorphose. One form of force, and that which dominates in the growth of life structure is Bathmism or Growth-force, which, under the direction of consciousness, subordinates ordinary inorganic forces to its use in building organisms. The lowest character of life is found in protoplasm which is conscious, and multiplies itself by nutrition and assimilation; this it is moved to do by stimuli, which, in earlier stages, are principally the pain of hunger and the pleasure of feeding; and, in higher forms, movements are caused by other stimuli as the pleasure of sexual indulgence, pleasure and pain caused by temperature, also by contact with external objects. The excitation of stimuli causes Bathmism to intensify circulation to the point carrying nutritive particles which are taken up by the protoplasm of the part and used in multiplying itself; that is, in growth. Use of an organ is such a stimulant. There is in all life-structures a tendency to repetitive action; this tendency soon becomes automatic, so it may be done unconsciously; when such time arrives, consciousness withdraws its attention and lets it take care of itself. In this way it comes that much of the life processes of animals, and nearly all those of plants are performed automatically; though originally each one in the first instance was possible only as a conscious, designed act for a purpose, and to attain an end. And through these processes of nutritive circulatory action, and assimilation determined by stimuli exciting pleasure or pain, with the tendency to repetition when once performed, at first always conscious but mostly through repetition falling into automatism, all the various organic forms have been moulded in a long course of ages. The transformation of living beings is brought about by one of two opposite tendencies of Growth—force—Acceleration and Retardation, by reason of

which the growth of an organ or function is either pressed forward at the expense of others or repressed for their benefit.

As a creator of life-forms, this is certainly far in advance of Natural Selection. But it is liable to much criticism. As to Prof. COPE's fanciful diffused consciousness in interstellar space, it is needless to say anything, for it does not seem to be a necessary part of the system. The idea seems to be that there can be no intelligence and no force outside of the mode, manner, and combinations, in which they are exhibited to us; and that, because we do not know force except as we see its behavior; with matter, and do not know intelligence or mind except as it makes use of machinery constructed of matter for the purpose of manifesting itself to us,—therefore they do not exist except as qualities or conditions of matter.

That intelligence is behind and works through all organic life in building and multiplying structure is readily conceded; but whether there be a distinct force through which it works, or whether it *only* uses the ordinary natural forces is a very different question. That it does use these natural forces to a very large extent we know; it seems more probable, therefore, that it uses them *only*; that there is no "vital force," but only a *vital intelligence* which controls and uses natural forces; no Bathmism, but only the ordinary natural forces working under direction.

But the proposition that consciousness, or intelligence, is an attribute of matter is untenable. They are two things as foreign in thought as space and time. The fact that in observation we have not seen intelligence disconnected or abstracted from some form of matter proves nothing. Neither have we seen matter disconnected from space, nor thought or motion from time; but it does not follow that matter is an attribute of space, nor thought or motion of time. "That consciousness, and therefore *mind*, is a property of matter is a necessary truth." "To say it is not an attribute of any kind of matter is to utter an unthinkable prop-

osition. To my mind the absence of tridimensional matter is synonymous with nothingness or absolute vacuity. To say that phenomena have a material basis is for me only another way of saying they exist." That closes up all possibility of argument with Prof. COPE on the character of mind and force. It would be like arguing colors with a blind man. But it is hoped there may be many who have not, like Prof. COPE, delved so long and so earnestly in the mines of the material sciences that they are compelled to think everything in the terms of matter, that they can think nothing else than matter; some who may be able to appreciate the absurdity of the proposition that an *attribute*, a *quality*, a *characteristic*, can hurl and keep *the thing, the substance* in which it inheres, in all manner of action, all forms of motion, for all time; many who can perceive that while mind and force are manifested to man's conscious intelligence, *only* by their behavior toward, and treatment of matter, they are really, in our necessary forms of thought, at least, separate and distinct from, above, and beyond, matter.

He says: "Nothing is more common than to hear life spoken of as though it of itself is a substance, and not as it should be as attribute or condition of substance or matter." Life is the manifestation of mind in organic matter. No warrant is known for calling it a substance; but it is certainly as legitimate and as logical as to call it "a condition of matter."

Prof. COPE is evidently right in supposing that an organ fitted for a useful purpose might have been constructed *only* by intelligence, on a plan, and with a design. But he is clearly wrong in assuming that any of the organic beings of present or geologic time possessed that degree and character of *conscious* intelligence, which did, or could have enabled them, to designedly originate any of the innumerable organisms that have been called into use in the two kingdoms of life, to say nothing of the still more numerous and mysterious chemical combinations brewed and in-

wrought into various life structures. So while he probably finds the form, he clearly does not find the *conscious* intelligence which could have originated organs.

It appears highly probable that an existing organ might have been enlarged by use, or aborted by disuse; that it might have been modified to suit a changing Environment; and, even where it could in some degree have been used for a new purpose, that it might have been gradually fitted to such purpose by use and effort. But it is not within the bounds of probability that a *new* organ, for a *new* use, could have been *consciously* planned and perfected by the Life-principle of the plants and lower animals; particularly so when we reflect what an amount of intelligent study, experiment, trial, and failure is involved in the successful invention of any piece of mechanism by the genius of man, such as the steam-engine, telegraph, reaper, sewing-machine, etc. Prof. COPE's theory involves the notion that each organ of each plant and animal was *consciously* projected in thought before construction. Think of a fish *consciously* planning lungs for breathing, a four-valved heart, mammalian reproduction, and legs and feet for walking!

This fallacy is destructive to Prof. COPE's philosophy of Evolution, using, as he does, consciousness in the sense of general intelligence. Granting for the present that this might have been possible in all muscular or molar actions and some others, it certainly never could have been so in that vast amount of molecular and chemical action which lay at the very root of all vital functions, and by which the almost infinitely varied secretions and organic elements of animal and vegetable structure were and are manufactured and assigned to position; for each and every one of them involves a knowledge of chemical forces and laws thousands of times deeper and broader than any chemist in the world has ever attained to. Therefore, to say that the first time any one of these thousands of

organic compounds was formed the Life-principle had *conscious* intelligence of what it was doing, and a design to do it that way on and for a purpose, seems to be a proposition too preposterous for discussion. Were it true, it would follow that the earliest and lowliest animals and plants which ever peopled earth had a vastly more profound and intimate *conscious* knowledge of the mysterious laws of molecular and chemical forces than is now possible to the most enlightened and industrious students of nature.

Prof. COPE accounts, as we have seen, for all change of form by an acceleration or retardation of growth, or both at the same time in different parts, by an assumed distinct principle which he calls *Bathmism* or *Growth-force*.

But conceding such a force, what is gained? How will it be shown that it is possessed of the characteristics of acceleration and retardation, by which Evolution is produced? Or, if it possesses such characteristics, by what is its action in particular directions determined? It will not do to say it is determined in the direction of new organs by use, for an organ cannot be used before it is in existence. It may be enlarged by use, as in the example of the muscles of the smith's arm, but cannot be so made.

If it be claimed that it is determined by the principle of adaptability, a fitting to the Environment, then it must be shown that the directivity has the capacity of understanding the Environment and knowing and determining how to shape the growth of the organism to accommodate it to the surroundings. An animal might wander on the banks of a lake eternally without being able, by wishing, to change its lungs into gills and its feet into fins; nor could any principle within do this unless it *had the end in view*, knew what was needed to accomplish it, and how to reach it by the means at command. In other words, Evolution by bath-

mism, if such a thing there be, must be through and by reason of an interior intelligence which knows to plan and carry out for specific ends and purposes. It must be by virtue of an intelligent creative cause within the organism.

Prof. COPE would supply a "vital force" to take the place of ordinary natural forces in the development of organisms by compelling acceleration or retardation of growth. If this compulsion be without plan and purpose, it is absolute Necessity; if with plan and purpose, it is all that is herein contended for; it is then an intelligent principle with all the necessary attributes of such a principle, and it matters very little by what name we may call it. Now, in incipient Evolution, Prof. COPE does seem to make it such a principle, with even the enlarged attribute of apperceptive consciousness. But he claims that in later stages this bathmic principle passes into automatism, that it loses its attributes of purposeful intelligence, and acts from acquired and fixed habits only. Now if this automatism were placed at the end of all Evolution, there would be nothing left at this point for discussion. But that is not where Prof. COPE places it, but early in the process, thus leaving a vast amount of development in species unaccounted for, or rather to be accounted for by an inadequate, because unintelligent and non-purposeful, bathmic force. And from this point on there is the same inability to account for Evolution by Natural Selection or any other proposed doctrine that we have all along considered. Prof. COPE would save an impersonal Evolution, or, perhaps in his own mind, remove the distinction between a personal and impersonal Evolution by beginning with intelligent and ending up with automatic bathmism. But right at this logical point his system breaks down, and he fails to find the "origin of the fittest;" for there is the same logical necessity for intelligent purpose in the last step of the process as in the

first. It cannot be admitted that even the muscular development of the smith's arm is automatic. The manufacture and assimilation of proper material, the increased circulation, and the appropriate selecting out and placing of particle by particle to produce the increased growth, are all profoundly intelligent, previsional and correlated processes, filling out a purpose and plan to meet a present need of Environment. Calling this correlated bundle of purposeful processes automatism or bathmism explains nothing. It is only hiding our ignorance under new terms.

Miss ALICE BODINGTON thus urges another argument against Prof. COPE's theory :

"This law, though it may indirectly lead to the 'survival of the fittest,' is equally likely through its blind action to lead to the extinction of an animal which had once been the 'fittest' in its relation to the Environment. There can be but little doubt that the enormous tusks of the early elephants and the formidable ones of many early carnivores would enable them at first to distance all competitors. But the law of acceleration tended, blindly, always in the same direction, till the old elephants seem to have been weighed down by their extravagant tusks, and the most highly specialized of all carnivores had canines so long that they could not shut their mouths : and both speedily became extinct."

And finally, whatever may be Prof. COPE's theoretical opinions on the subject, his philosophy of Evolution turns out to be baldly materialistic ; for matter is made the primal essence and mind but its attribute, thus leaving no place for Deity and no hope of a future individual existence to the soul.

The fundamental errors of Prof. COPE's system, then, are : (1) making mind an attribute of matter ; (2) assuming, without proving, a *bathmic* force ; (3) failing to find a reason for his unintelligent bath-

mic force working towards purposeful ends ; (4) assuming the consciousness of organic intelligence in the first instance ; (5) assuming that such supposed conscious organic intelligence passes into and becomes fixed in automatic action.

RESULTS OF THE ARGUMENT.

In *Genesis of Nature*, I attempted to show the entire inadequacy of Mr. SPENCER's philosophy of Evolution. In this work I think I have now shown conclusively, the utter inadequacy of the three evolutionary systems of M. LAMARCK, Mr. DARWIN, and Prof. COPE, to account for the "Origin of Species," or indeed, for any peculiarities or modifications in organic nature at all, because of the fact that they each *assume* and *fail to find* an *unintelligent* or *materialistic* basis for the fitting of the "fittest" to pass through the relentless mill of Environment. I think, on the contrary, that it has been clearly demonstrated that such "fitting" must everywhere and always be intelligently done ; that under every possible circumstance unintelligent and non-purposive principles are incompetent to the work ; that Mind, and never either Chance or Necessity, rules everywhere and always in organic nature.

And this is the end and purpose of the argument of this chapter and this book,—to demonstrate beyond all cavil that organic nature is a Creation and not a simple mechanical outgrowth ; that it is the product of Mind, and not of inexorable Law. The discussion of the *manner* of the Creation of Nature—as to whether it has been *per saltum* by absolute productions of first forms of being, or by a gradual and imperceptible evolution of higher forms out of lower, or whether it may not have been sometimes the one and sometimes the other, has not fallen within the purview of the work. When the learning of the age shall once conclude to permit God entrance to His own Universe at all,

it will be found that He is competent to create in either way, or in both ways ; and that we may follow in His footsteps and admire His handicraft, but must not attempt to hedge His paths about. Prof. LE CONTE most aptly remarks that "either God operates Nature or Nature operates herself ;" and when man becomes reconciled to letting Him do so, it will be seen that He is able to create Nature in His own way, and by His own means. Non-purposive Nature could never have evolved man from a monkey. God is equally competent to have made him out of a monkey or of the dust of the earth outright ; equally competent to have occupied a hundred million years in his production, or to have produced him in less than the winking of an eye. In which way He did produce him, is a question addressed to the records, the books of Nature and Revelation ; and in turning the pages of either it is well for us to remember that the most fallacious of all arguments is that founded upon the assumed incompetency of God ; that "the weaver who arranges the threads and knows beforehand what the aspect of the web will be" (PAPILLON), has so thrown the warp and the woof of that Nature that His intelligent and intelligible patterns can never be accounted for by unintelligent processes ; to do which seems to be the great and impossible task that nearly all Evolutionists have heretofore set themselves down to accomplish, forgetting ST. GEORGE MIVART's aphorism : "God will not allow Himself to be caught in the bottom of any man's crucible."

But without arguing for or against Creation by Evolution, I think several fundamental facts are clearly indicated as entering into the basis of such a philosophy : (1) An intelligent vital principle in all organic beings, carrying with it all ancestral forms, or a composited form drawn therefrom, and also a knowledge of Environment more or less intimate. (2) A capacity in this vital principle of organizing

germs and placing within them like intelligences to its own. (3) A previsional intelligence which conforms it to the requirements of Environment. (4) Such previsional intelligence generally appearing simultaneously in all or at least a vast proportion of the individuals of a species in a particular habitat or region of greater or less extent. (5) Such simultaneous appearance of the same faculty of intelligence in many individuals occurring only as the result of a plan formulated by some superior purposive power.

As a conclusion, if God would cast a new species through evolutionary processes to fit a new Environment, we may suppose that all or nearly all the individuals of a particular habitat would be endowed with a faculty of previsional intelligence directed towards the impression of variations in such direction, of magnitude sufficient to save them in the siftings of such new Environment.

Prof. LE CONTE is just out (since the writing of this chapter) in the *Andover Review* in an article that well illustrates the arguments herein presented as well as the general tendencies of the opinions of religious scientists. In discussing "*The Relation of the Church to Modern Scientific Thought*," he thus sets forth, in his fascinating style, his notion of Deity: "God is immanent, resident in Nature. Nature is the house of many mansions in which He ever dwells. The forces of Nature are the different forms of his energy, acting directly at all times and in all places, and determining all its phenomena. The laws of Nature are the modes of operation of the omnipresent divine energy, invariable because He is perfect. The objects of Nature are the objectified, externalized states of divine consciousness,—divine thoughts objectified by the divine will. In this view we return again to direct action, but in a nobler, spiritual, god-like form. He is again brought very near to every one of us, and restored to our love. In Him we live and move and have

our being. By Him all things exist, in Him all things consist; without Him there would and could be nothing."

To the superficial thinker this is a grand conception of God; but Prof. LE CONTE himself sees the difficulty in the way of its acceptance and pleads in confession and avoidance of it. He thus states the objection: "But it will be objected that this view of the relation of God to Nature is nothing less than Pantheism; that it destroys the personality of Deity, necessary foundation of all effective religion; that by this view God becomes a sort of vital principle of Nature operating unconsciously and by necessary law." This conclusion is the necessary logical result of Prof. LE CONTE's philosophy, and it is that absolute Necessity, regnant alike over Deity and the human soul, which we have everywhere found to be the only alternative to a volitional Personality freely dominating all natural law.

He thus states his plea in avoidance: "In our view of the nature of God, the choice is not between personality and something lower than personality, namely, a blind unconscious force operating by necessity, as the pantheist and materialist would have us believe; but between our personality and something immeasurably higher than personality as we know it." This is Mr. SPENCER's argument for his *Unknowable*, and it is equally unjustifiable in either application. For what does it amount to? Simply, that our deepest knowledge of Nature and highest powers of thought give us only a cast-iron, necessarian Pantheism, without freedom or individuality anywhere; but that as compensation, we may assume and presume that entirely outside of and above our highest range of comprehension, the Deity which we have logically weighted down within a frame of adamant, does in fact rise into an atmosphere higher than our grandest conceptions of personality and wider than our broadest notions of liberty. It first bars Deity within doors of logical

Necessity, and then assumes that our logic is vain and false and the highest results of reason an inadequate misconception. If this is a correct process of reasoning, in the same manner any proposition that was ever framed may be established.

But Prof. LE CONTE says : "This view is now at last verified, and well-nigh demonstrated, by the theory of Evolution. No other view is any longer tenable." Whether any other view is longer tenable, I am satisfied to risk on the arguments already herein advanced. But it borders on the absurd to talk of demonstrating anything by a "theory." And admitting the reality of Evolution, it neither demonstrates nor argues a necessarian Pantheism ; for, as we have seen, it is equally open in the very first instance for us to argue an Evolution by a free purposiveness, as by necessary and unchangeable law. Of course, if it should be admitted, first, that Nature is by Evolution rather than by Creation, and, next, that Evolution is by eternally established and inexorable law rather than by the free volition of a personal God,—it would necessarily follow that Deity, if any room should be left for such a Being at all, is only an all-pervading, impersonal Pantheistic principle. And then if we should assume to presume anything about it at all, we might presume one thing as readily as another, and with equal unlikelihood of being right, whatever the presumption might be.

Still later Prof. FISKE is out in an article in *Popular Science Monthly* (September, 1891, p. 577), containing some sublime conceptions of Deity, which, taken alone, might very well comport with a doctrine of free purposive personality. Says he : "For, into whatever province of nature we carry our researches, the more deeply we penetrate into its laws and methods of action, the more clearly do we see that all provinces of Nature are parts of an organic whole, animated by a single principle of life that is infinite and eternal. . . . The Infinite and

Eternal Power that animates the universe must be psychical in its nature ; any attempt to reduce it to a mechanical force must end in absurdity, and the only kind of monism which will stand the test of an ultimate analysis is monotheism.

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"The doctrine of Evolution, which affects our thought above all things, brings before us with vividness the conception of an ever-present God—not an absentee God who once manufactured a cosmic machine capable of running itself, except for a little jog or poke here and there in the shape of a special providence. The doctrine of Evolution destroys the conception of the world as a machine. It makes God our constant refuge and support, and Nature His true revelation ; and when all its religious implications shall have been set forth, it will be seen to be the most potent ally that Christianity has ever had in elevating mankind."

But while there is a large measure of ambiguity in this language, taken in connection with the principles of Prof. FISKE's Cosmic Philosophy, so often referred to, it can mean no more than Prof. LE CONTE's necessarian Pantheism just considered. The God it so beautifully outlines is, after all, no more than an impersonal, immaterial principle permeating all Nature, and animating and compelling it to action according to uniform, unchanging, and eternally necessary laws, so that Necessity reigns supreme at last. It is not in reality God who acts in Nature, but a compelling Necessity behind and above God. And as I have before insisted, if there be Necessity at all, there is no room for God : either it must be a free, volitional, purposive, and personal God, or else there is no use and no place for a God at all. It must be the one or the other. There is no room for compromise. Nevertheless, beguiled by a confusion of ideas, Profs. LE CONTE and FISKE attempt such a compromise. They attempt to give us a God active, potent, and helpful, but at the

same time bound by the cast-iron fetters of eternal Necessity and unchangeable Law. How could a God incapacitated to act to the smallest extent outside of an eternally predestinated plan be "our constant refuge and support?" Things will occur as fixed in the laws of Nature at the eternal beginning, as well without as with such a God. Under such a doctrine of Nature, events will transpire, as from the very first they are fated to do, despite the power of men or gods. No such philosophy can be made to harmonize with any phase of the Christian religion, for that counts on a prayer-hearing and prayer-answering, personal, and volitional God of providence and of miracle, whose will is not only the source of all Law, but regnant over all Law. Let the two philosophies be definitely separated and sharply defined, for herein lies the strength of the Christian doctrine of a personal Theism, while necessarian Pantheism finds support in a logical mirage only.

CHAPTER VIII.

MIRACLE.

Profs. STEWART and TAIT say: "The energy of the present system is to be looked upon as originally derived from the invisible universe, while the forces which give rise to the transmutations of energy probably take their origin in the same region." (*Unseen Universe*, p. 199.) LESAGE held that: "The forces which set in motion the molecules of visible matter are derived from the unseen universe."

And I think I have demonstrated in *Genesis of Nature* that Gravity, as well as several other of the ordinary forces of Nature, is continuously received into the visible material universe from without. Were this not so, should this inpouring of gravity into all known matter be suspended for the thousandth part of a second, all Nature would rush into chaos. Therefore, in the sense that all material Nature is dependent upon and upheld by a source of Power not amenable to her laws and outside of the visible, the whole universe is an everlasting *miracle*. Nature is but a dependency upon an unseen Power. So far from being able to run herself, as the Materialists argue, should she be left alone she would be utterly unable to sustain herself in *statu quo* for the shortest imaginable period of time. This is and must be true, not in any figurative sense, not simply from a theological or metaphysical view, but from a purely physical and mechanical view—from that aspect of the case which will be accepted as the scientific view so soon as Science is prepared to exchange metaphysical theories concerning the

doctrines of Force and Motion for practical, common-sense physical notions.

It has already been shown at great length that in all living beings there is an intelligent principle disparate from both the material elements and the forces which compel the movements of the material, a principle which dominates both the forces and the matter of each living body. It has also been shown that in each bud, and germ, and egg, and seed of every living being is wrapped by the parent-being a like principle with like potentiality; so that the Life of a single germ of to-day may multiply itself into like lives of millions of like germs by to-morrow and each of these may go on and on, multiplying endlessly in the same manner; that where there is a single Life-principle with a definite potentiality and purposiveness to-day, there may arise out of it by to-morrow, or next year, or next century, untold millions of like Life-principles, with like purposive potentialities. And this is or was true of every fertile living being that does now exist or ever has existed on earth. The intelligent principles which carry on the processes of life of to-day are, many of them, not those which were active yesterday; still fewer of them were existent a year ago; exceedingly few of them had being a hundred years ago, and none of them a thousand years ago. These are facts that cannot be gainsaid, facts patent to all who will observe them, though heretofore they seem to have been too dazzling for the naked eye of thought.

Now, what shall we conclude from them? They are existent things in the visible Universe now, a little while ago they were not. Therefore they have come into visible, tangible existence. How and from whence? At first blush two possible hypotheses present themselves for consideration: when the parent being would develop a new bud or germ, it creates a Life-principle to animate it; or it calls such principle from the invisible. The first is a *miracle absolute*, the second a *miracle relative to*

visible Nature. For three reasons I think the second hypothesis preferable. (1) It seems a contradiction in thought to suppose that a power or principle can create a *power* or *principle* of like essence and potentiality with itself. (2) We know of no stuff out of which Life can create Life, and we cannot conceive that it can create it out of nothing. (3) We see gravity and other physical forces coming into visible Nature from without, and when we see new *Life* coming into existence, analogy points very strongly to the same source. That is to say, each Life has the power to call from the unseen "vasty deep," other Life-principle, with capacities of knowing, purposing, willing, and acting like to its own, and wrapping it in separate individual centres of organization, and to give to each a pattern to work by, according to principles already discussed in the chapter on Heredity.

Thus far we have facts, but not beyond. How any Life makes the call for more Life, or how it is responded to, we do not know. There are some considerations, however, that it may be well to note as we pass. The call and the response would seem to be instant, as though no time is occupied in traversing space. It is stated by astronomers that it takes light, travelling at the speed of 186,000 miles per second, three and a half years to traverse the distance to the nearest fixed star; and it has been said that the more powerful telescopes reach nebulae so distant that it takes light 100,000,000 years to make the passage. The two facts taken together seem to argue, either that Mind and Force, disparate from Matter, are things which do not occupy Space at all,—that they occupy Space which to our senses is vacuous; or else, which amounts to the same thing, that Space is in reality, and as known to Supreme Wisdom, something very different from what we know it. Of recent years certain transcendental physicists have argued in favor of a fourth dimension to space. This I think is entirely

incomprehensible to human thought—at least while we give the term *dimension* its usual meaning. However, we are used to talking and thinking of spiritual existences, but not of dealing with them in the terms of physical science. Nevertheless, we find Force and Mind continuously poured into the visible universe from the *invisible*, and from the *immediately present invisible*, unless Space and Time are very different realities from what we think them to be. That is to say, the invisible and the visible, the spiritual and the physical, are closely interlaced and interlocked both in Time and Space as well as in Cause and Effect. Or rather, we may say, there is a continuous *transfusion* from the invisible and spiritual into the visible and physical. To this latter fact Science can and must testify; but as to the where and how of the unseen, she is, and perhaps ever must be, dumb. Yet some propositions necessarily grow out of said fact. For instance, Mind and Force must come from where Mind and Force are. They must come according to some rule and law. Rule and Law are the modes in which intelligent purposive volition acts. Therefore they come from and at the compulsion of a personal and purposive Mind. Therefore the Life of any organic being may call for *more* Life, for *new* Lives, *more* Mind, *new* Minds, to wrap in *new* organisms; but the answer must be from a Personality in the Unseen, dominating Forces and Minds. This is all *natural* in the sense that God is the author of all Nature; it is a *miracle* in that it is the act of God in and from the Unseen directly affecting the Seen. This I understand to be the *scientific idea* of miracle. And therefore each and every new Life in every race of beings that has existed on earth has been the direct product of a *miracle*. No logic can overturn this proposition, no sophistry can avoid it. Not many seasons hence Science will be compelled to acknowledge it.

The bearing of these conclusions upon the doc-

trine of Evolution is very direct and positive. If each new Life is a miraculous gift from the hand of God, it follows, as a necessary conclusion, that each new race has the same origin ; and if His plan of creation was to press existing races forward to fit changing Environment, He in giving new Life could readily give the necessary variations ; and not only so, but variation over a whole district, province, or region, insuring the necessary isolation to prevent "swamping out the varietal changes by intercrossing." This theory gives us a logical and scientific "Origin of the Fittest," one that is not self-contradictory, and does not lead to necessarian Materialism. It is one also in harmony with the laws of Being, of Mind, and of Heredity, as we have found them. Then who is prepared to say it is not God's way, or at least one of God's ways, of creating species ? And who is prepared to dispute with God a plurality of *modes* of creating species ? Just how He may impress into the principle of Heredity the necessity of a particular change in any race of beings I do not know, any more than I know how He gives Life at all. But that He *does* do so is irrefragably proven by the occurrence of varieties in species. But whether some or all species have been created by thus pressing varieties further on and on, is, as already stated, a question beyond the discussion of this book. Enough that we have found the utter helplessness of Nature without the everlasting inpouring of Life and Force from the invisible hand of Deity ; enough that we have found that God *does* create in one way or another.

But, as intimated, it may be claimed that these inpourings of creative power from without the visible are only parts of the natural—so that in a higher sense they are not miraculous at all, but normal ; and that with this higher order of naturalness there is no interference ; that when we rise to this higher plane, where we can take into view both the visible and invisible, everything then becomes mechanical,

a "continuity of law;" that, seen as a whole, no still higher Power ever reverses the action of the machine or interferes with it in any other way. Thus BÜCHNER says: "It would be an insult to our readers were we further to expatiate on the impossibility of miracles. No educated man who has acquired but the most superficial knowledge of nature, still less a man proficient in science, can at this day believe in a miracle. In the eyes of Science all miracles are alike: they are the outcome of an ill-regulated fancy, combined with an utter ignorance of the laws of Nature." (*Force and Matter*, p. 100). But Prof. HUXLEY, as I understand him, makes miracle a question of evidence; he admits, as all must admit who concede the existence of a God at all, that miracles are not impossible. But he claims that they are unproven; and, if not exactly disproven, that the weight of evidence against them is so great, it is against reason to accept them. I do not purpose examining the question further than to note the character of the negative evidence on which Prof. HUXLEY relies. It is, as I understand, the uniformity of natural law. Nature runs along under the dominance of certain observed laws with an absolute regularity and certainty which we cannot suppose ever to have been interfered with, except upon the most irrefragable proof to the contrary; and such proof we do not have. That is to say, we do not ordinarily see God interfering with Nature; we are bound to believe that He is uniform and consistent in the government of the world; and, therefore, it is not a supposable case that He has ever suspended or reversed any of the laws by which He governs it.

Now this view seems very persuasive, and in fact very conclusive; provided always that we can be sure of the premises. But there is a broad assumption underlying the argument that needs to be examined. It is the *uniformity of the conditions* under which God operates the laws of Nature. This

constant uniformity of conditions, Prof. HUXLEY must *assume*, to give his argument any value whatever. But are we justified in assuming that the conditions under which we see God governing this world of man and nature, are everywhere and have always been the same? What do we know about it any way? This world is scarcely more than a speck in God's Universe; the few centuries during which Science has been registering God's manner of dealing with nature is scarcely the tick of a watch compared to Eternity; man's consciousness is as yet almost an unexplored region, for no scientist or philosopher has ever yet been able to get out of his *own* consciousness to explore that of any other man. How, then, can it be claimed that we know enough of the conditions of God's Universe to be able to say they are everywhere and always so uniform that He never introduces any new manner of operating them? Is Prof. HUXLEY prepared to say that the conditions of humanity in Britain at the end of the nineteenth century are so like the conditions of humanity in Palestine at the beginning of the first century that God's treatment of it must be on the same uniform plan?

Let us put a supposititious case. Let us suppose a Humanity, the whole circle of whose existence was comprehended within three terms—birth, reproduction, and dissolution; a Humanity with God-like capacities, hopes, and aspirations, yet chained to appetites and passions the most destructive, and vices the most degrading. And suppose, further, that God in His mercy had planned to let down into such Humanity a new system of life, wherein and whereby, on certain terms and conditions, such Humanity might justify its hopes, capacities, and aspirations, might master its appetites and passions, might rise above its vices, might be born into a new and immortal life, into a *New Kingdom*,—is Prof. HUXLEY prepared to say that in the preparation for and setting up of such a new system of life,

and publishing the fact, the law and the conditions of the same to such a Humanity, there would be found such a uniformity with affairs as they exist eighteen hundred years after such an event, after the New Kingdom had been established and its laws promulgated, that necessarily God then applied and used His laws *only* as He now applies and uses them in Nature? I think he is prepared to claim no such thing. I think he has the candor to say that, granting the contention of Christianity that such a *New Kingdom was thus introduced and set up*, very probably the conditions of the process were such as to require the exercise of different powers and a different manner of controlling natural law from what Science has been able to discover in operation at the present time. I think that here the whole basis of Prof. HUXLEY's argument against Biblical miracles drops out. Using MIVART's figure, I think he wholly fails to "catch God at the bottom of his crucible." That is to say, the whole question comes back as one of evidence without any presumptions against it. It is a question of the Record—a Record unimpeached by its nonconformity to scientific uniformity of natural law.

But let us look at a little different aspect of the question. The horse may have originated in the hipparion and man in an ape, and the development may have been by steps imperceptibly short and slow, or by single and sudden strides; but until Philosophy discovers some all-prevailing law or process in Nature adequate to the achievement of these results,—an attainment which, as we have seen in these pages, she has not yet reached,—the alternative remains to look for explanation to that principle which, beyond all discussion, is competent to the production of the phenomena, whether such processes were by easy stages or enormous leaps, whether involving many or only one intervention of power in each case. And such intervention

must be accepted as miraculous and creative, until some other principle shall be found adequate to the production of said results.

In our own day the kea of New Zealand has developed, as we have seen, from a fruit-eating into a flesh-eating bird with most remarkable instincts, and there is no known natural law which can account for the wonderful conversion. Until Philosophy can point out some natural principle or process which has compelled this change of instincts and habits, or upon which it may be explained, it must be referred to that Power which is competent to all things.

But here the Materialist may demand what purpose God could have had in causing such a singular change in this bird. The purposes of God are oftentimes imprisoned in the womb of the centuries, subject to disclosure and vindication only by the lapse of ages, or eons, as the case may be. So it may be highly presumptuous—it is certainly most illogical—for feeble man to found philosophical systems upon God's undisclosed purposes, or apparent lack of purpose, it may be. God may, for aught I know, for aught any human can know, be shaping the kea to meet purposes to be developed hundreds or thousands or millions of years hence; or, for aught I know, His purpose is to place before the eyes of living Materialists a living act of miraculous Creation! However that may be, the Christian philosopher can, if he chooses, for explanation point to a Power entirely adequate and competent to the accomplishment of this remarkable phenomenon, whether it be called natural or miraculous, evolutionary or creative; whereas the Materialist, as shown all through these pages, is utterly at sea, without rudder or compass, the sport of winds from every quarter, while attempting to account for this and other such phenomena on principles and processes shredded of every

fibre of will and purpose. It is miraculous Creation, or it is utterly without explanation.

And so throughout the realm of nature. All transformation has been and is through and by reason, either of some non-purposive principle, power, or process, or else of purposive Will. If the former, it is Evolution ; if the latter, it is miraculous Creation, however minute, tedious, and continuous the changes of form. Between these two propositions there is no possibility for accommodation. The one or the other must be wholly and exclusively true, for if any part of nature can have been unfolded without purpose, then it all may have been ; if any part of it compels the predication of an intervening Will, then every part must do the same. And the minuteness or magnitude, the slowness or rapidity of the transformations have no bearing upon the discussion. If there be some unintelligent and undirected Power anywhere in Nature adequate to the production of the simplest of her organisms, then we must concede that the same Power is adequate to the production of the greatest and of all, and we have a logical basis for a necessary system of Evolution. But if there be no such competent unintelligent Power, then the only possible alternative conclusion is that transformations must be the result of intelligent purpose intelligently exercised, that is, of Divine interference in miraculous Creation.

The great search of Evolutionists is for such an unintelligent non-purposive principle, adequate to the accomplishment of the *seeming* purposive transformations and productions with which the kingdom of Nature is crowded ; and heretofore such search has been utterly futile.

And it is no avoidance of the issue to say that God has a plan on which He evolves or educes one form of existence out of another. It may be so. He may have one such plan of creation ; He may have many such plans ; He may have one or many

utterly diverse plans—all that is a question of fact; and however it may be, it does not militate against the proposition that it is all and in every case, however imperceptibly minute to human senses, the result of the intervention of His power, according to His own purpose. Nor does it matter that such intervention may be repeated, both in number and duration, on the same lines and in the production of the same ends, almost to infinitude. It is still God's work, still the carrying out of His intelligent purpose, still His Creation; and each change, however minute, being a new phase on the face of Nature, a new production, by and through God's power, intelligence, will, and purpose, is a Miracle.

Evolutionists have seemed to proceed on the hypothesis that by sufficiently minimizing and multiplying the stages of transformation a new principle will be inducted into nature, through which they can manage to get along very well without God, or at least set Him off at so great a distance that He need have no other employment than "to see nature go." At most, they have thought to find some mediary principle between nature and God, which He having formulated once for all, is adequate to run the machine without further oversight from Him. As so often shown, no such principle has been found, nor in the nature of things can be, since the very least change must necessarily be something new, a different aspect and phase of things, a pointing in a new direction, a new step in a plan old or new, and therefore necessarily involving intelligent action towards an end. The smallest of all possible changes must, in the very nature of things, be a link in the eternal chain of Necessity, or else the result of a free exercise of purpose, and, if the latter, then the intervention of Divine Will. So neither minimizing nor multiplying the steps in any real or supposed line of transformation can

have any logical significance. God is as competent to the smallest possible change and the slowest possible gait as to the most stupendous exercise of power. And every change, whether minute, oft-repeated, and in apparent regular order and sequence, or stupendous, rare, and unusual, must be by a purposeful intervention of His power. Simple repetition, though multiplied to infinity, could never give transformation, never give anything new, but only extension of the old. Therefore every *change*, whether great or small, must be the result of a new manifestation of power, a new direction of energy; and, if in the line of system or organization, must be an exhibition of intelligent purpose. As before remarked, the only way of avoiding this conclusion is by invoking absolute and eternal Necessity. So it is all necessary, *mindless Evolution, or purposeful, miraculous Creation.*

CHAPTER IX.

MAN THE ANOMALY.

Mr. A. R. WALLACE contends that Man was an animal developed like other animals up to a certain stage marking the highest limitations of Evolution, above which he has been raised by creative Power. The argument is that man possesses physical, mental, and moral faculties which could not have been produced by Natural Selection; first, because of the enormous gap between some of them and the corresponding faculties, organs, and conditions of the highest of the lower animals; and, next, because others of them could have been of no beneficial use in their incipiency. Under the first branch of the argument principal reliance is placed on the difference between the brain capacities of the lowest men and the highest apes. The average Teutonic skull has a brain capacity of 94 cubic inches, the average Bushman 77 inches, while the largest known gorilla is only $34\frac{1}{2}$ cubic inches, and the average 30 inches. The ourang-outang and other apes have still less brain capacity. On the other hand, the earliest prehistoric human skulls show but very little less capacity than those of man to-day. But the most remarkable fact is that an adult human with skull less than 65 cubic inches is invariably idiotic! Now, if man is a creature *evolved* from some race of apes, on what theory can it be explained that they, with 30 inches and less of brain capacity, have very considerable degrees of intelligence, placing them in the very front rank of beasts, while man, with 65 inches, is still idiotic? It would

seem that if man is *only* an advanced ape, there has been, along with his advancement, some very peculiar retrogression, as yet unaccounted for.

But Mr. WALLACE's second branch of the argument is the stronger. This he prefaces with a proposition already quoted in other language from Mr. DARWIN: "The first principle of 'Natural Selection,' no less than of the general theory of Evolution, is that all changes of form or structure, all increase in the size of an organ or in its complexity, all greater specialization or physiological division of labor, can only be brought about in as much as it is for the good of the being so modified. Mr. Darwin himself has taken care to impress upon us, that 'Natural Selection' has no power to produce absolute perfection, but only relative perfection; no power to advance any being much beyond its fellow-beings, but only just so much beyond them as to enable it to survive them in the struggle for existence. Still less has it any power to produce modifications which are in any degree injurious to its possessor; and Mr. DARWIN frequently uses the strong expression, that a single case of this kind would be fatal to his theory." (*Natural Selection*, p. 334.) Proceeding on this basis, Mr. WALLACE instances the loss of hair from the body as a change that must have been injurious to the half-ape, half-human being. And this argument is very strong, for some such covering would seem to have been an absolute necessity until the human had become sufficiently advanced to fabricate his own clothing; and at that stage, if still clad with hair, Necessity, "the mother of invention," would not have intervened to point out the utility of such fabrication. In other words, Natural Selection would not have stripped him of his hairy covering while he had need of it; he had need of it until he had learned to make and wear warm clothing; and he would not have learned to make and wear clothes until he had need of them, and he did not have need of them while he retained

his natural covering. So there was no place for Natural Selection to step in.

GRANT ALLEN suggests a really ludicrous theory of evolution in this matter, by supposing that male apes rubbed the hair from their backs and shoulders while lounging on their haunches against trees and rocks, and that the females, preferring these denuded males, Sexual Selection first established and then extended the fashion.

With justice, also, Mr. WALLACE urges that the voice, in the "wonderful power, range, flexibility, and sweetness of the musical sounds producible by the human larynx," is not explicable on the principles of Natural Selection, since the faculties of song cannot have given to early savage man any advantage in the struggle for life.

But it is in the higher mental faculties, "the capacity to form ideal conceptions of space and time, of eternity and infinity; the capacity for intense artistic feelings of pleasure, in form, color, and composition; and for those abstract notions of form and number which render geometry and arithmetic possible"—that Mr. WALLACE finds the greatest gap between the beast and man, and the greatest lack of utility in incipiency. And it does, indeed, seem difficult to assign any utility to several of these faculties in their earliest development. Take the American Negro, many of whom in different directions have attained to respectable scholarship and some to eminence. It cannot be maintained that during the six or eight generations they have been under the influence of white civilization there has been opportunity for Natural Selection, or other evolutionary principles, to have developed faculties for higher abstract thought. Then they must have brought these faculties with them, must have possessed them in savagery; but in that state of what possible utility could they have been to them? of what possible benefit for the Guinea or Congo native to have the capacity for finest music or the

higher mathematics? Profs. STEWART and TAIT appear to think WALLACE's arguments conclusive: I cannot consider them quite so, though they are very persuasive.

However, I think, the strongest argument against the evolution of man from any lower animal is yet to be considered in a discussion presented, but not made the most of by any means, by the DUKE OF ARGYLL: "It is a universal fact of consciousness as regards ourselves, and of observation in regard to others, that knowing evil to be evil, men are nevertheless prone to do it; and that having this sense of moral obligation, they are nevertheless prone to disobey it. The fact is entirely independent of the particular standard by which men in different stages of society have judged certain things to be good and certain things to be evil. It is entirely independent of the infinite variety of rules according to which they recognize the doing of particular acts and the abstention from other acts to be obligatory upon them. Under every variety of circumstance in regard to these rules, under every diversity of Custom, of Law, or of Religion by which they are established, the general fact remains the same—that what men themselves recognize as duty they continually disobey, and what according to their own standard they acknowledge to be wrong they continually do." (*Unity of Nature*, p. 190.) Again: "Man has been, and still is, a constant prey to appetites which are morbid, to opinions which are irrational, to imaginations which are horrible, to practices which are destructive. All savage races are bowed and bent under the yoke of their own perverted instincts—instincts which generally in their root and origin have an obvious utility, but which in their actual development are the source of miseries without number and without end. Some of the most horrible perversions which are prevalent among savages have no counterpart among any other created Beings, and when judged by the barest

standard of utility place Man immeasurably below the level of the Beasts. None of the Brutes have any such perverted dispositions, none of them are ever subject to the destructive operation of such habits as are common among men. And this contrast is all the more remarkable when we consider that the very worst of these habits affect conditions of life which the lower animals share with us, and in which any departure from those natural laws which they universally obey must necessarily produce consequences so destructive as to endanger the very existence of the race. Such are all those conditions of life affecting the relation of the sexes which are common to all creatures, and in which Man alone exhibits the widest and most hopeless divergence from the Order of Nature." (*Ibid.* 216.) Again: "It is impossible to look abroad either upon the past history or the existing condition of Mankind, whether savage or civilized, without seeing that it presents phenomena which are strange and monstrous, incapable of being reduced within the harmony of things, or reconciled with the Unity of Nature. The contrasts which it presents to the general laws and course of Nature cannot be stated too broadly. There is nothing like it in the world. It is an element of confusion amidst universal order. Powers exceptionally high spending themselves in activities exceptionally base; the desire and the faculty of acquiring knowledge coupled with the desire and the faculty of turning it to the worst account; instincts immeasurably superior to those of other creatures alongside of conduct and of habits very much below the level of the beast,—such are the combinations with which we have to deal as unquestionable facts when we contemplate the actual condition of Mankind. And they are combinations in the highest degree unnatural; there is nothing to account for or to explain them in any apparent natural necessity.

"The question then arises, as one of the greatest

of all mysteries, How it is and why it is that the higher gifts of Man's nature should not have been associated with corresponding dispositions to lead as straight and as unerringly to the crown and consummation of his course, as the dispositions of other creatures do lead them to the perfect development of their powers and the perfect discharge of their functions in the economy of Nature?

"It is as if weapons had been placed in the hands of Man which he has not the strength nor the knowledge nor the rectitude of Will to use aright. It is in this contrast that he stands alone. In the light of this contrast we see that the corruption of human nature is not a mere dogma of Theology, but a fact of science. The nature of Man is seen to be corrupt not merely as compared with some imaginary standard which is supposed to have existed at some former time, but as compared with a standard which prevails in every other department of Nature at the present day. We see, too, that the analogies of Nature are adverse to the supposition that this condition of things was original. It looks as if something exceptional must have happened. The rule throughout all the rest of Nature is that every creature does handle the gifts which have been given to it with a skill as wonderful as it is complete, for the highest purposes of its own Being, and for the fulfilment of its part in the Unity of Nature. In Man alone we have a Being in whom this Adjustment is imperfect,—in whom this faculty is so imperfect as to often miss its aim." (*Ibid.* 218.)

Again: "The only really exceptional fact connected with Man is not that he has faculties of a much higher kind than other creatures, nor that these faculties are susceptible of a corresponding kind and measure of development, but that in man alone this development has a persistent tendency to take a wrong direction, leading not towards, but away, from the perfecting of his powers.

"As a result of this tendency, a very large por-

tion of Mankind, embracing almost all the savage races, and large numbers of men among the most civilized communities, are a prey to habits, practices, and dispositions which are monstrous and unnatural : one test of this unnatural character being that nothing analogous is to be found among the lower animals in those spheres of impulse and action in which they have a common nature with our own ; and another test being that these practices, habits, and dispositions are always directly injurious and often even fatal to the race". (*Ibid.* 222.)

Every one knows and admits that as regards the production, distribution, and possession of wealth the general frame of society is sadly out of joint. One half the community, if not in actual want or on "the ragged edge of despair" as to the wherewith to "keep the wolf from the door," is ground down by perpetual anxiety concerning the means of meeting pressing liabilities and obligations. Many of these, though anxious to work, begging for work with muscle or brain, willing to till the fields, build the ships and houses, the roads and bridges, make the ploughs and weave the carpets, find the doors of labor shut against them and their proffered contributions to the accumulations of society refused. Society needs what they offer to produce, and in return they need bread and covering and shelter and yet by reason of its very constitution, which shackles it tighter than would bands of iron, Society is self-compelled to reply : "No, you shall not have fields to till, nor shops to work in, nor tools to work with ; you shall not have the opportunity of using muscle and brain in earning bread."

And yet well does Society know itself to be all the poorer and worse off for lack of that very labor which it refuses, knows that its own great need is the product of that very work which it will not, or rather, which under its present frame, it cannot accept and recompense. At the same time a full tenth of Society, already possessed of a superabun-

dance of this world's goods, are intent on using every lever that capital, business tact, and legislative and legal favor can command to squeeze from the middle and laboring classes still more of the accumulations which the latter need so much and the former not at all. Another tenth, like the drones in a hive, are lolling in indolent idleness, feeding to satiety on sweets which others have accumulated. Another tenth live by callings which though under legal sanction and rated honest at the Exchange, are unmitigated curses to Society. Still another tenth make the community a prey to their wits by practices which, if not always criminal, are never commendable. So not more than one tenth of all who live in this most favored land can feel, at the going down of every sun, that by and through their own exertions, in ways that have not been hurtful but rather beneficial to Society at large, they can, without anxiety, count on their own honest crust for the next day, the next week, and the next year.

Everybody sees, feels, and knows all this; yet where is the remedy? Indeed, until quite recently it has usually been accepted as the normal and rightful condition of society. The few have been deemed rightful masters of the many; the white man of the black, the wise of the ignorant, the strong of the weak. Human society has been regarded as a struggle for existence, where the "Fittest"—that is, the strongest—will and *ought* to survive, and the weakest perish. Here, as elsewhere, it has been held: "Nature wants nothing but a fair field and free play for her darling, the strongest." But the underling, the broken, the crushed moiety of human society, may indulge some shadow of hope for the future, since, although this state of affairs may be *normal* to a humanity all twisted awry, it can be demonstrated that it is not *rightful*, that it is an inverted and disrupted Nature which makes "the strongest her darling" and rejoices in the destruction and obliteration of those

who fall on the artificial lists erected by an artificial and cross-sighted condition of society; for where the right is, the remedy, though often slow, is always sure.

It is no part of my purpose to enter into the question of remedies, but I may remark that no full remedy lies in an increase of knowledge, because the whole of the evil does not lie in a *lack* of knowledge. It is true that at every step in life there is a dividing of paths where man must choose, and if he chooses rightly must choose *according* to knowledge; and therefore knowledge is not only of immeasurable benefit, but an absolute necessity to right living, because an absolute necessity to right choosing at the crossings of the ways. Happy would man be if knowledge, even the most extensive and thorough attainable, were the only need. But it is not, because ignorance is not the only evil. Reason with the chart of knowledge in hand stands at the dividing of the ways to choose; but often Reason is veiled and her chart inverted by passion, prejudice, or predilection; by appetite, influence, fashion, or superstition. Often, with the sign-posts before her plainly marked and no doubtful obscurations over the ways, she deliberately chooses the wrong path, wilfully walks in the crooked way. Or, if not so, she is often helpless to walk in the desired paths, as in the social and economic aspect just discussed. Society at large and individually would prefer to see everybody profitably employed, so that all might be fed and clad and housed and educated. But Society is shackled and helpless to cast the fetters. It is a craft drifting in a resistless current, running down and swamping and crushing its own life-boats on the rocks without remedy. Good men and women everywhere weep over pitiful poverty, while resistlessly helping to drive the mill which continuously crushes out, more and more, the hearts, the hopes, and the lives of the indigent. And weep and pray

as they may, the mill grinds on, and all who do not lend a hand to urge it round must inevitably fall in and be broken and ground into fine dust by it. Such is Society. Such does our human nature necessarily make it. And why? Because of unbridled passions and appetites which we permit to run riot, to our own detriment and damage, often to our undoing and ruin. One of the most harmful of these propensities is covetousness, the keen craving for more of earthly goods than the necessities and comforts of life demand. This is unnatural, because it is never beneficial to the individual and always hurtful to Society; for one cannot have more than he needs without compelling others to accept, by just so much, less than they need. The accumulation of millions or of hundreds of thousands in the hands of single individuals is an unmitigated evil to Society, and an unrequited wrong to the laborers who create all the wealth in existence. Nevertheless, avarice is an almost universal evil—so much so, indeed, that at least ninety-nine out of every hundred poor men who berate rich men as robbers would, if they had ability and opportunity, become ten times as rich, and many of them, perhaps, ten times as arrogant. But this only illustrates and emphasizes the unnatural and reversed order of the passion, and the depth to which it is embedded in poor human nature. And can Knowledge eradicate it or Science dig it up? Alas! no. Its roots reach deeper than any human wisdom may penetrate. Now this side of the evil, knowledge cannot cure, Science cannot remedy, because the evil itself lies in ignoring knowledge, in refusing to Reason her rightful sovereignty over conduct. All that knowledge can ever do is to point the way; and even in this she may lamentably fail when dominated by passion or prejudice. But having directed the way, Reason is powerless to compel the Will to walk in it. She cannot uproot passion and appetite. Often hatred,

envy, revenge, jealousy, and innumerable other wicked feelings take possession of the Mind and drag the man down, with eyes wide open. Now, the remedy, if remedy there be, must be deeper than knowledge; it must be somewhat that can control if not eradicate these worst elements on the moral side of Man's nature, by reversing his evil inclinations and subordinating passion and appetite to Reason.

I may remark before passing on, that the remedy on the economic side of the evil, and of the moral side so far as it rests upon the economic, is contained in two short propositions: "Stop the waste of human energy;" and, "Equalize the benefits of Nature and the products of human labor." A true Ethical science, when we come to have it, will teach men that all waste of human energies is most deadly sin; a true science of Political Economy, if we ever attain to it, will point out the innumerable leaks of energy in Society, and show how little legislation can effect towards calking them. But while there is hope for a better and truer science of social and economic life, when attained,—as already argued,—it can go but a small way in correcting the actual evils of Society; for it is the dispositions and inclinations of men, much more than their opinions, which need to be upset and remodelled. Any salutary reformation must depend upon the heart much more than upon the intellect. When philosophers find a means of taming appetite and passion through knowledge, there may be some hope of Science without Religion becoming sufficient for the redemption of Society.

Considering now some other specific injurious dispositions and habits of civilized man, let us take first the body and soul killing alcohol habit to which hundreds of thousands of the most intelligent classes yield deliberate, if not willing servitude, well knowing and fully realizing the necessarily destruc-

tive results in every possible direction, not only to themselves but to their offspring, and their race. For the fiscal year ending June 30th, 1890, 208,565 persons, or firms and corporations, paid Government licence in this country, as manufacturers of or dealers in spirituous and malt liquors. Every one of these persons, if not wilfully closing his eyes because of self-interest or prejudice, knows that the business is hurtful and destructive to all the best interests of society, the state, and the race. In the same period the quantity of distilled spirits manufactured was 111,101,738 gallons; of malt liquors 868,201,236 gallons; consumption, total per capita, spirituous liquors, 1.80; malt liquors, 13.67 gallons. That is 77.5 gallons to each family in the country. The same year there were 25,202,901 bushels of grain used in the manufacture of the two classes of drink, enough to have fed 3,000,000 of people bountifully.

Or take the tobacco habit, more unnatural and repulsive, and much more general, if not quite so destructive. In the year 1888 there were 747,326 acres cultivated in tobacco in the United States, with a yield of 565,795,000 pounds, while 19,753,610 pounds were imported. The cultivation and handling of the crop on the farms required the labor of at least 350,000 hands. These laborers might have tilled 3,500,000 acres in grain and produced 70,000,000 bushels of bread for the hungry, enough for 10,000,000 people a whole year. And yet every pound of this most exhaustive crop to the soil, helped to poison some human body and plant in it the seeds of scrofula, tumor, cancer, paralysis, imbecility, and innumerable other disorganizing and repulsive ills, both for the present and future generations. And intelligent men know all this, are compelled to know it, and yet they cultivate the habit. Teachers know it and yet learned professors set the habit before their pupils; preachers know it, and yet preachers sometimes walk the streets

with cigars in their mouths; none know it better than physicians, and yet, perhaps, no class is more addicted to the habit.

If the energies, the labor, the wealth, absolutely wasted on these two destructive vices could be all turned into beneficial channels how all the lower levels of Society would be lifted up and the waste places made to blossom! What other taxation has ever compared with these two evils? What is the question of high or low tariff, or free silver, or sub-treasury, or reciprocity, or any other political issue to the weal of Society, compared with these two giant evils? Yet they are evils based in perverted and reverted appetites, known by their slaves to be hurtful and killing—appetites which are at war with Natural Selection, simply because they *are hurtful and killing*.

Or take human belligerency. Nations fight to vindicate their honor, for territorial aggrandizement, for commercial privileges, for church dominance, to protect the shackles riveted on enslaved races. And what does war mean? Carnage and destruction—the death and mutilation of the bravest and the best; the destruction of all the products of labor. It means suffering, calamity, and impoverishment. It means demoralization and degradation. Therefore it is one of the greatest of all evils. Every one knows this, every one admits it. Yet Society is unable to avoid it. A wicked spirit of wrong, aggression, or tyranny, takes hold of a people against some other, and such other, if not animated by an equally bad spirit, as is generally the case, is compelled to fight to preserve its freedom or existence. Animated by ambition, greed, revenge, or fear, Europe is a hostile camp to-day, with several millions of its strongest and best standing in enforced idleness armed to cut each others' throats. Why do not the nations disarm? Because they are dominated by passions which will not let them. Passion is the master, while intellect and all

good desires are helpless. All intelligent people know what needs to be done ; all the wisdom of the world is inadequate to devise how that need can be accomplished, incompetent to invent how the most enlightened peoples on earth can so far command their own evil feelings as to become content to forego the pastime of human butchery.

Or take the disposition of mind which prompts to acts of cruelty,—from what root, on what principles, or by what processes could that ever have been developed ? So far as we know there is nothing like it amongst the lower animals. True, they kill without pity and without compunction, but they kill to live, they slay to eat, and not for the simple gratification of witnessing suffering and death, not for heartless pleasure and sport. The heart of the wolf never melts over the fawn upon which he breakfasts, neither does he strike down that fawn for fun. He is too low to do the one, and too high to do the other. Only man is noble enough to weep over anguish and base enough to delight in pain and carnage. In this respect he is higher than any beast and lower than any beast. Not only so but the beast presents no phase of character from which the cruelty of man can have been evolved, for the mental characteristic which prompts man to slay the pheasant, the squirrel or the trout for mere sport, bears no likeness or relationship to the trait which leads the tiger to slay the antelope or man himself, to satiate his own hunger. There is no connecting way over which one may have grown into the other. And certainly there has never been any principle of evolution announced which will account for man's cruelty, since it can never be beneficial but only hurtful to both the individual and the race.

Or let us consider the bearing of the propensity referred to by the DUKE of ARGYLL. In the very lowest created beings the germs of future generations are simply cast forth in the proper medium for their development without instinctive prepara-

tion or future parental care. In higher orders we find instinctive preparation for the developing young, but no further parental attention. In still higher animals we find little or no preparation, but instinctive affection, care and protection. In others still we find both preparation and protection. To a certain extent, parallel with these parental instincts, we find the sexual instincts in different degrees. In most of the lower orders and in many of the higher, this instinct is wholly promiscuous. In others it is polygamous. In others it is monogamous for a single mating which may or may not be for the term of the being's life; while with others yet, it is monogamous for a life of several seasons.

It is only the monogamous matings which are compatible with the notion of the Family in its strictness and purity, save in those exceptional orders of compound beings as the jelly-fishes, and social animals as bees, both already discussed. Now in Man the instinct of affection for his young in both parents is strongly developed, and this, with the helpless condition in which the young are brought into the world, with its long period of adolescence, makes the family relation for life the proper one for the protection of the young and the highest development of the race. Therefore the monogamous *status*, being necessary to the family *status*, is the only proper condition for mankind.

Now let us see where we stand as to man. (1) He is born into the world helpless and continues so for a fourth of his life at least. (2) Therefore he needs parental protection. (3) He is provided with parental affection in both parents which insures protection. (4) This makes parental coöperation in the parents necessary and is fully attainable only by the establishment of the family. (5) But the family is possible only on the basis of a lasting affection between two of the opposite sexes, consummated by monogamous habits. (6) We have in

harmony then : (a) helpless offspring for a long term of years ; (b) parental affection in both parents, leading to protection ; (c) the sexual passion limited to single persons of the opposite sex ; (d) by a pure individually concentrated affection upon one person for life. (e) This gives monogamy and the Family. (f) It is the natural order for Man. (g) Not only do his instincts and his affections in their purity lead to this, but his reason reënforces the argument with powerful conclusions drawn from history and the whole social fabric of humanity. (h) Not these only, but the proposition is powerfully supported by another instinct not found amongst the lower animals at all—*Modesty*.

It is true that with some animals the monogamous instinct is strong enough to prevail without modesty, but it is not seen how modesty could exist, or if it existed at all, of what use it could be amongst creatures entirely promiscuous in their sexual habits. Many of the birds without reason and without modesty form sexual life-alliances which no temptation ever causes them to violate ; but how is it with man with a like instinct in sexual affection and that reënforced by both reason and modesty ? In some, love is stronger than death and is true under all circumstances so that life is strictly monogamous, but in what a vast proportion of cases is he polygamous or promiscuous in his sexual habits to the known injury of himself and his race ? How often is it that the lower appetite topples over the higher instincts of pure affection and modesty supported by all the conclusions of reason ! How came the high and the pure so intermingled with the low and the base in man's nature ? With each order of animals its sexual instincts and appetites are the best for its condition and lead in the path best for its race. Man alone deserts the constraints of his higher and purer and better instincts, and with eyes full-open and reason alert, plunges

head-foremost into the basest and most destructive excesses.

And now the questions press for consideration : With his baser appetites in full sway how could the nobler instincts ever have been evolved, seeing that now, reënforced by reason, they are in such a large proportion of cases unable to control his habits ? Or with the nobler instincts in possession how could the baser ones ever have been developed, since they are ever and always hurtful and destructive ? And particularly how could the instinct of Modesty ever have been evolved, seeing that it is always in exact contradiction to all tendencies to promiscuous habits ? It could never have grown up amongst such habits. And man with Modesty and Reason being so little able to resist the baser instincts and downward tendencies of his nature, when dominated by these how could the nobler instincts of a pure monogamous affection as well as parental affection ever have grown up without or even with the support of both Modesty and Reason ? If he cannot be held up by them how could he have been built up without them ?

And so I might go on enumerating the evil appetites, feelings, dispositions, and passions of mankind, all harmful to society, all tending to human debasement and degradation, all unnatural and retrogressive. But further enlargement on the subject is not necessary to my argument.

All this has been considered normal and natural. This view the DUKE OF ARGYLL shows is not correct : "The theory is that the vicious and destructive habits and tendencies prevailing among men are not aberrant phenomena at all, but are original conditions of our nature,—that the very worst of them have been primitive and universal, so that the lowest forms of savage life are the nearest representatives of the primordial condition of the race.

"Now, assuming that this were true, it would follow that the anomaly and exception which man

presents among the unities of nature is much more violent and more profound than on any other supposition. For it would represent the contrast between his instincts and those of the lower animals as greatest and widest at the very moment when he first appeared among the creatures which, in respect to these instincts, are so superior to himself. And it is to be observed that this argument applies to every conceivable theory as to the origin of man. If his birth, or his creation, or his development, whatever its methods may have been, took place after the analogy of the lower animals, then along with his higher powers of mind there would have been corresponding instincts associated with them to guide and direct those powers in their proper use. It is in this essential condition of all created things that man, especially in his savage state, presents an absolute contrast with the brutes. It is no explanation, but, on the contrary, an insuperable increase of the difficulty, to suppose that the contrast was widest and most absolute when man made his first appearance in the world. It would be to assume that, for a most special and exceptional result, there was no special or exceptional cause." (*Unity of Nature*, p. 223.)

This is a most profound analysis of and reply to the popular belief on the subject; but it stops just short of the point I want to make, which is, that none of these hurtful appetites, feelings, or propensities ever could have originated in Natural Selection, since it perpetuates only the useful to the race. Man is full of qualities harmful and deadly, detrimental to both individual and racial progress; therefore man has not been evolved by Natural Selection, and so I support Mr. WALLACE from the opposite side of man's moral nature in an argument that no casuistry can trifle with. Natural Selection will not tolerate race-destroying qualities. Man is a prey to the soul and body devouring appetites or passions of avarice, belligerency, cruelty, vanity,

jealousy, incontinency, gluttony, drunkenness, and a host of others; therefore *man cannot have been the result of Natural Selection*. And the conclusion is and must be the same whether the rudiments of these passions and appetites are found in the lower animals, or the contrary as insisted upon by the DUKE OF ARGYLL. Therefore if man is a creature of development it must be on some other system entirely.

A close analysis will show that the profound difference between man and the lower animals, pointed out by the DUKE OF ARGYLL, lies in this aspect of the question: When the lower animals become degraded it is to suit a changed environment. They do not degenerate, do not contract destructive habits in a uniform environment; but, as the environment changes they must change with it or perish. If the change is such as to favor degraded forms, instincts, or habits, they are liable to become adjusted to it. But man contracts degrading habits, and cultivates degrading instincts and appetites, irrespective of his environment, and at war with his individual and racial welfare. Therefore, while man has faculties immeasurably higher than any beast, so much higher that it is doubtful if even the rudiments of some of them can be found in any lower animal, he also has propensities lower than any beast, and not only lower, but of an inverted character from those of any beast, since their legitimate tendency is to kill body and intellect, individual and racial, in person and progeny.

And here the DUKE OF ARGYLL comes in with another profound reflection. It is, that man is equally capable of development downward as upward, against his environment as with it. "There is this great distinction between the lower animals and man—that in their case failure involves death and complete extinction, while in his case it is compatible with prolonged survival. So far as mere existence is concerned, the almost infinite plasticity

and adaptability of his nature enable him to accommodate himself to the hardest lot and to the most unfavorable conditions. . . . Presumably, therefore, all the ages which have been at work in the development of civilization have been at work equally in the development of savagery. . . . The conclusion is, that neither savagery nor civilization, as we now see them, can represent the primeval condition of man. Both of them are the work of time. Both of them are the product of evolution." (*Unity of Nature*, p. 231.)

We can now lay down the following conclusions concerning man

- (1) He was not developed by Natural Selection.
- (2) He possesses attributes so noble that they cannot have been developed from any animal.
- (3) He possesses propensities so base that they cannot have been derived from any animal.
- (4) He differs from all animals in that he possesses appetites, passions, and propensities which are destructive and deadly, irrespective of Environment.
- (5) He is prone to indulge in these evil courses with deliberate knowledge and appreciation of the evil in them and of the results.
- (6) His whole moral nature stands in reversed order, therefore, from all other known beings.
- (7) Moral retrogression is the easy and natural path to him ; progression is a struggle against his natural tendencies.
- (8) Going back to former chapters, his physical organism could have been produced only through prevision ; in his moral characteristics it would seem that all prevision had been overturned by some chaotic convulsion of his nature. If there was any wise intention in placing within his mind the fearfully destructive and debasing propensities so fully considered, it was a wisdom entirely above our comprehension. We cannot attain, at least we never have attained to it. Everywhere else, nature either

presents actual plan and purpose or such a mimicry of plan and purpose as to deceive the strongest human intellects—here alone she presents the very converse of plan and purpose ; here alone, side by side with man's most purposeful appearing intellectual powers, and so knit in with them as to be unsusceptible of being unravelled out, are a whole circle of moral propensities whose normal results are to reverse the previsional plan and purpose of nature, and plant chaos and ruin where otherwise law and order would reign. And as the DUKE OF ARGYLL well says, this “is not a theological dogma,” it is not a metaphysical theory, but a hard and stubborn fact, open and patent to all who do not close their eyes against it. It is a fact which must be taken account of in every philosophy of human nature, in every system of ethics, economics, or politics, and in every theory of theology or religion. That science which attempts to deal with any human relationships without first taking measure of this abnormal and reversed condition of man's moral nature, starts out on erroneous premises and must necessarily be at fault all the way through. And this proposition covers a vast amount of latter-day *Science*, so-called. Indeed, some philosophers seem to dream that they can blaze out a broad highway to an early millennium without ever once touching this fundamental principle, this universal condition, this saddest fact in all the circle of human knowledge. And yet, if Mr. SPENCER, or one more gifted, if such should ever appear, could succeed in emblazoning a royal way to human perfection and felicity, as with a pillar of cloud by day and a pillar of fire by night, our pitiful humanity could not follow it if it would and would not if it could, for such is Man the Anomaly.

CHAPTER X.

IMMORTALITY.

BUT there is another life-process that I do not find accounted for by Evolution of any form—Death! In the first place, as no living being had ever experienced death before reproducing its kind, the transmission of the fatal necessity must always have been through prevision or anticipation; so that here the action of Heredity is unlike what it is in any other instance. In the next place, the direct beneficial quality of death to a race of beings is not perceptible. It would, so far as we can see, have been as well for the immediate benefit of any race that it should have been made immortal on Earth, with a limitation on its powers of reproduction. That death and reproduction afford opportunity for future beneficial improvement of races there is no doubt; but such benefit is long in the hereafter, and can have no special present utility, nor any utility at all, except by prevision. It is true, also, that the present plan of life contemplates death, since the living feed upon the dead. But this is provision in one race wholly for the benefit of others, which is not within the purview of Evolution, and can, I think, be accounted for only upon the supposition of a general creational plan formulated by Superior Intelligence. But Death reigns! And what does that mean? That the organism falls to pieces, the visible material crumbling back to the visible dust, whence it was taken; the invisible spiritual, presumably, falling back to the invisible whence it

was taken. However, the one the eye of Science can follow; the other it cannot. Profs. STEWART and TAIT say: "If we take the individual man to begin with, we find that he lives his short tale of years, and that then the visible machinery which connects him with the past, as well as that which enables him to act in the present falls into ruin and is brought to an end. If any germ or potentiality remains, it is certainly not connected with the visible order of things." (*Unseen Universe*, p. 195.) The inquiry which has been the question of the ages is: Does the thinking soul retain its personal identity after death? Some claim that it does not, and that it is not desirable that it should.

Thus Dr. GEORGE M. GOULD says: "I have a strange inability personally, to understand the to me absurd hunger after personal identity. It appears to me a childish obtuseness of character. . . . I do not see how people can fail to understand that personal identity is not only impossible, does not exist now and here, but that the desire of it is the renunciation of progress. . . . The immortality that is alone possible or desirable is the losing of our life, the individual identity-loving life, again to find it as the impersonal but richer, deeper life of nature and God. God denies you an immortality of individualism and identity, because He loves you so well that He refuses you your crude, childish desire, in order to offer you something infinitely better. . . . The love of individualism is the love of imperfection. . . . The more we rise into that impersonal atmosphere, the more are we careless of the fate of personal identity. . . . The products of organization die with disorganization. . . . Death, thank heaven, is the end of that, the certainty of a non-eternalizing of the imperfect. . . . The old selfish dream of heaven apart from incarnation, from doing and becoming, was a pitiful mistake. . . . And if you have been born again of the spirit you will have no such desire, but

will beg for kindred work upon the old earth-home." (*Monist*, p. 391.)

I must admit that I have neither appreciation nor sympathy for such expressions of opinion and feeling. I think no one who has ever been smitten by a genuine hunger for knowledge can be content to deliver up his individual personal consciousness while yet picking up the very first handful of "pebbles" on that strand which is to him at once the shore of the Universe and the shore of Eternity. It seems incredible to me that any who has ever truly loved and lost, or been loved by the lost, can be satisfied with the feeling that the individual consciousness of such lost has perished out of existence. I can very well understand how one may, by what seems to him the weight of evidence, be forced to believe in such doctrine, but not how he can ever take pleasure in believing in it. Such pleasure appears to me entirely abnormal and unnatural, as much so as that of the condemned criminal contemplating with rapture the gallows upon which he is to be executed. Like CAMILLE FLAMMARION, I claim that "the gravest and most interesting of all questions to ourselves is that of our continuous personal existence. The existence of God, of the entire Universe, touches us far less intimately. If we ever cease to live (for what is the span of a human life in the light of Eternity!), it is a matter of utter indifference to us whether other things exist or not." For I believe with him also that "the thirst for knowledge is one of our best faculties." Did I not know some very excellent people who profess to find a sufficient compensation for the loss of personal immortality in Altruism, I should be tempted to say with PASCAL: "The immortality of the soul is a matter so important that one must have lost all moral sensibility if he remains indifferent to it."

Nevertheless, again I am constrained to quote FLAMMARION: "Personally, I declare that I have not

yet discovered for myself one fact which proves with certainty the existence of soul as separate from body." And yet, who has not stood at the cruel portal of the grave of love, and with yearning inspired by despair sought to wrench from Nature an answer to the interrogatory, "If a man die, shall he live again?"

BÜCHNER says : "We see that what we call spirit, soul, consciousness, disappears with the cessation of the individual combination of matter; and it must appear to the unprejudiced mind that this action, having been brought about by peculiar and very complicated unions, must come to an end with its cause—that is to say, with the cessation of those peculiar combinations." And Dr. GOULD, as quoted above: "The products of organization die with disorganization." But they both put the matter too strong ; for the soul is not the "product of organization," of "individual combinations of matter;" it is not "brought about by peculiar and very complicated unions" of matter : on the contrary, the soul itself causes and compels organization, produces the "individual combinations of matter" in which life is manifested. At least, such is the argument urged in this work, and logically urged, as is believed.

Nevertheless, viewed in the light of science there are immense difficulties in the way of the opposite conclusion, demanding our attention. (1) There is precisely the same evidence that in the smallest microscopic being organization is produced by a Life-principle, the soul, that there is in man. The manifestation of mind in reproduction is alike in both and all, as explained in the chapter on Heredity. In all living beings Life is drawn from the invisible by parent-life and individualized in the germs. Scientifically, what better right have we to claim that the individualized soul of man will retain its personal individual identity after dissolution, than that the souls of the infinitely numerous

creatures of all orders which people earth will do so? I see none. (2) And the same difficulty applies in considering the earliest human germ-life. (3) And again we see the soul of man growing from the infinitely small life-speck in the earliest germ to full intellectual maturity and then often declining in the same gradual manner until it almost reaches imbecile nonentity, "burning out like a candle." If such a soul retains its identity after dissolution in what condition? that of vigorous intellectuality or vacuous imbecility? BÜCHNER has urged these arguments against the immortality of the soul with great ingenuity and power. The question is whether at death the soul "dissolves into its elements," as does the body? Does it go back whence it came and as it came unaffected by its temporary individualization in the body? or does it carry with it the separate personality it there attained to? It seems to me that Science is dumb of answer here. It has been shown that in physical Nature a vast amount of force comes from the invisible, is individualized for a time in material masses and then discharged, presumably to go back whence and as it came. May it not be so with Mind or Spirit? May it, too, not go back and be lost in the universal ocean of Spirit something as Dr. GOULD evidently believes? That seems to me to be according to the analogies of Science. We know individualized mind or spirit only as the organizing principle in nature, only as wearing a material body. We do not know it either before or after its union with the body; Science can not determine its state either before or after birth, reproduction and death,—that is the circle Science knows. That is the only story Nature has to tell. If the soul has an individual personality after death, it seems not to be provided for in the scheme of visible Nature; it is something Nature's laws, as we know them, do not necessitate—something Nature's logic does not lead up to—something the

reason for which must lie with the fact itself *in the invisible*. Neither the proof nor the disproof of the fact are to be found within the visible.

Now, taking man as Nature places him before us, subject to all the course of nature's laws ending in dissolution, as we have seen ; and suppose a capable Power should determine to save up his personality, to sift his soul in its individual integrity out of the chaos of the final catastrophe, would it not involve the formulating of new conditions and relations for the soul, and its subjection to new laws and forces ? Would it not amount to superimposing a *new* nature upon the *old* so far as the human soul-relations should be concerned ? a setting up a new kingdom of Nature within the old ? howbeit, as yet only a *spiritual* kingdom, since its establishment would be for spiritual existences ? This all seems a clear and logical supposition so far—a plan formulated to enable the un-individualized soul to pass into new relations, into a new state, a new kingdom at death. Of course God is competent to arrange such a plan, and Science is in no position to interpose a veto.

But let us extend the supposition. The plan formulated does not contemplate forcing unwilling parties like Dr. GOULD into immortality. More than this, it does contemplate submitting the whole matter to the free choice of man in this life, giving him the free volition of entering into or remaining outside of said new relationship. And still more, the plan carries with it a moral cure, a moral code requiring those who accept it to conform to certain lines of feeling and conduct. What does all this involve ? Evidently, (1) Bringing the soul into these new relations while yet tabernacling in the body ; (2) Informing man of this supernatural arrangement with such demonstrations and proofs as will convince his intellect ; (3) This information being of things outside of Nature—*supernatural*—will have to be brought to his attention by some

means above Nature—*supernatural*—because no facts in nature would ever lead up to it; (4) Not only will man need to be informed of the fact of the new arrangement for his benefit, but if he accepts and enters into the new relationship he must become *conscious of the fact*, must be enabled to appreciate the conditions with which he is brought in contact; (5) Either the new information with which his mind is enlightened, or the new relations in which he finds himself, or both, must influence his feelings and conduct. Evidently God was and is competent to do all this, and what warrant has Science to interpose any objection?

If such has been God's plan and purpose with man, the whole matter, lying entirely outside and above the natural, can not in any sense be an outcome of Evolution by Natural Selection or other method. And further, it must lie entirely apart and disconnected from all those systems of myths, superstitions, and false religions which have been invented by the ingenuity of the human mind. Science has been fond of conjoining the two, and making the former the evolutionary outgrowth of the latter; but if the former is any thing of the character of our supposititious case, all this is impossible; they are processes arising from different causes and under different systems of law. Science may very well take account of stock in all that originates under the *natural laws of thought* in the human mind; but she is incompetent to gauge the principles and laws which God may formulate above and let down into the natural and visible to enable man to carry his personal individuality out of and beyond the chaos of physical dissolution over into the unseen and eternal. There is a limitation set upon the domain of Science that she will do well to heed. Whether God has so planned for man is a question of fact, but a question of fact of such a character that it falls entirely outside the alembic of Science. As said of miracles, it is a question of the records

only, but the records, if any such there be, must in the nature of things *lie in Revelation* and *individual Consciousness*, since they *can not lie in the Natural*.

And these considerations dispose of Dr. DRUMMOND's theory that the realm of natural law is carried over into the spiritual. On the very face of the proposition it must be apparent that if natural law is inadequate to conserve personal individuality in the catastrophe of physical dissolution, such natural law must be inadequate to the sustentation of that frame of the supernatural which God may have planned as a new basis of individuality to the human soul. The theory put forth by Profs. STEWART and TAIT of the carrying of this "Law of Continuity" into the "Unseen Universe" is equally untenable, if they mean by that anything more than that the human soul continues to exist there as the same personality individualized here. No doubt, as already shown, all forces disused here, pass back to the invisible whence they were drawn; but not under the same laws of action and adjustment to which they are subjected here; so that really about all that it is possible to make out of any law of continuity flowing from one universe to the other, is the proposition of necessary continuous existence in some form or other. For more than this Science has no data, no basis for calculation.

Then what is the conclusion of the whole matter? It is this: If a personal immortality is vouchsafed to man at all, it must be by and through a new arrangement not contemplated in the original frame of Nature, not provided for by ordinary natural physical, physiological and mental laws, not within the grasp of scientific knowledge, but containing its own plans, purposes and laws. Such a system must be let down into or superimposed upon Nature, it must be supernatural in all its relationships. Therefore it could neither have been established nor evidenced by natural means. Hence Science is incompetent to testify either for it or against it,

much less to construe its laws or pronounce on the probability or improbability of the methods of its introduction and establishment. It appears, therefore, that Science is greatly worried by considerations entirely outside her field of observation. Indeed, the "conflict between Science and the Christian Religion," while very *real*, is, at the same time, entirely *factitious*, since the frame of principles and laws upon which they respectively rest, lie in realms nowhere adjoining. It is not the province of the theologian, as such, to pass upon the facts of Science; no more is it in place for the Scientist, as such, to determine theological doctrines. *Facts* in the two realms are not in conflict to-day, never have been in conflict, never will be in conflict; not even when Science shall have extended her already vast empire ten thousand times deeper into the secrets of Creation. It is never the *facts* of the two systems of thought which stand opposed, but the unwarranted *theories* superimposed upon the facts. The vast amount of worry and feeling that has thrown a shadow over both fields of thought has been the outgrowth of unjustifiable, not to say presumptuous, assumption. Hence no Religionist need let either the progress or the assertions of Science drive his faith from its moorings, nor even disturb his equanimity in the least. Nor is it necessary that, like Prof. FARADAY, he should entertain two conflicting sets of opinions; one for his Religion, and one for his Science. It is only necessary for him to remember, that the Christian Religion, if true at all, is of necessity based upon principles and laws entirely disparate and independent of Nature as we know Nature, and is, therefore, in no wise amenable to her laws, nor subject to the methods of Natural Science.

